Honeywell

SMV 800 Series HART/DE Option User's Manual

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Revision 1, October 2015

Honeywell Process Solutions
1860 Rose Garden Lane
Phoenix, AZ 85027

About This Manual

This manual provides the details of programming Honeywell SMV 800 SmartLine Multivariable Transmitters for applications involving HART and Digitally Enhanced (DE) communication protocols. For installation, wiring, and maintenance information refer to the *SMV 800 SmartLine Multivariable Transmitter User Manual*, document number 34-SM-25-03.

The configuration of your Transmitter depends on the mode of operation and the options selected for it with respect to operating controls, displays and mechanical installation. Details for operations involving the Honeywell Multi-Communication (MC) Tookit (MCT404) and SmartLine Configuration tool (SCT3000) are provided only to the extent necessary to accomplish the tasks-at-hand. Refer to the associated

The SMV 800 SmartLine Multivariable transmitter can be digitally integrated with one of two systems:

- Experion PKS: you will need to supplement the information in this document with the data and procedures in the *Experion Knowledge Builder.*
- Honeywell's TotalPlant Solutions (TPS): you will need to supplement the information in this document with the data in the *PM/APM SmartLine Transmitter Integration Manual*, which is supplied with the TDC 3000 book set. (TPS is the evolution of the TDC 3000).

Release Information

SMV 800 Series HART /DE Option User Manual, Document # 34-SM-25-06 (this document)
Rev. 1.0, December 2015 – First Release

References

The following list identifies publications that may contain information relevant to the information in this document.

SMV 800 SmartLine Multivariable Transmitter Quick Start Installation Guide, # 34-SM-25-04

SMV 800 SmartLine Multivariable Transmitter Safety Manual w/ HART, 34-SM-25-05

SMV 800 SmartLine Multivariable Transmitter User Manual, # 34-SM-25-03

MC Tookit User Manual (MCT404), Document # 34-ST-25-50

SCT3000, SmartLine Configuration Tool guide, Document # 34-ST-10-08

PM/APM SmartLine Transmitter Integration Manual, # PM 12-410

SMV 800 Series Multivariable, Analog, HART Communications form, Drawing #50049892

Smart Field Communicator Model STS 103 Operating Guide, Document # 34-ST-11-14

Technical Bulletin, Communicating with Honeywell™ ST3000/STT3000 Smart Transmitters, #TB-960704B

Patent Notice

The Honeywell SMV 800 SmartLine Multivariable Transmitter family is covered by one or more of the following U. S. Patents: 5,485,753; 5,811,690; 6,041,659; 6,055,633; 7,786,878; 8,073,098; and other patents pending.

Support and Contact Information

For Europe, Asia Pacific, North and South America contact details, see back page or refer to the appropriate Honeywell Solution Support web site:

Honeywell Corporate	www.honeywellprocess.com
Honeywell Process Solutions	https://www.honeywellprocess.com/smart-multivariable-transmitters
Training Classes	http://www.honeywellprocess.com/en-US/training

Telephone and Email Contacts

Area	Organization	Phone Number
United States and Canada	Honeywell Inc.	1-800-343-0228 Customer Service 1-800-423-9883 Global Technical Support
Global Email Support	Honeywell Process Solutions	ask-ssc@honeywell.com

Contents

List of Figures

List of Tables

1 SMV 800 Physical and Functional Characteristics

1.1 Overview

This section is an introduction to the physical and functional characteristics of Honeywell's family of SMV 800 SmartLine Multivariable Transmitters.

1.2 Features and Options

The SMV 800 SmartLine Multivariable Transmitter type SMV 800 supports five device variables: DP, SP, PT, Flow and MBT and four dynamic variables: PV, SV, TV and QV. Primary variable (PV) can be configured as DP, SP, PT and Flow. Secondary Variable (SV), Tertiary Variable (TV), Quaternary Variable (QV) can be configured as DP, SP, PT, Flow and MBT.
The dynamic variables can be set to any of the said device variables. Table 1 lists the protocols, human interface (HMI), materials, approvals, and mounting bracket options for the SMV 800 Transmitter.

Table 1 – Features and Options

Feature/Option	Standard/Available Options
Communication Protocols	HART 7 and Digitally Enhanced (DE)
Human-Machine Interface (HMI)	Advanced Digital Display
	Three-button programming (optional)
	Advanced display languages: English, German, French, Italian, Spanish, Russian, Turkish, Chinese & Japanese
Calibration	Single, Dual and Triple Cal for PV1 (Diff.Pressure) and PV2 (Static Pressure)
Approvals (See Appendix C for details.)	ATEX, CSA, FM, IECEx, NEPSI
Mounting Brackets	Angle/flat carbon steel/304 stainless steel, Marine 304 stainless steel
Integration Tools	Experion

1.2.1 Physical Characteristics

As shown in Figure 1, the SMV 800 is packaged in two major assemblies: the Electronics Housing and the Meter Body. The elements in the Electronic Housing respond to setup commands and execute the software and protocol for the different pressure measurement types: DP (Differential Pressure), SP (Static Pressure), PT (Process Temperature and MBT (Meter body Temperature).
Figure 2 shows the assemblies in the Electronics Housing with available options.

The Meter Body provides connection to a process system. Several physical interface configurations are available, as determined by the mounting and mechanical connections. Refer to the *SMV 800 SmartLine User's Manual*, document number 34-SM-25-03 for installation and wiring details.

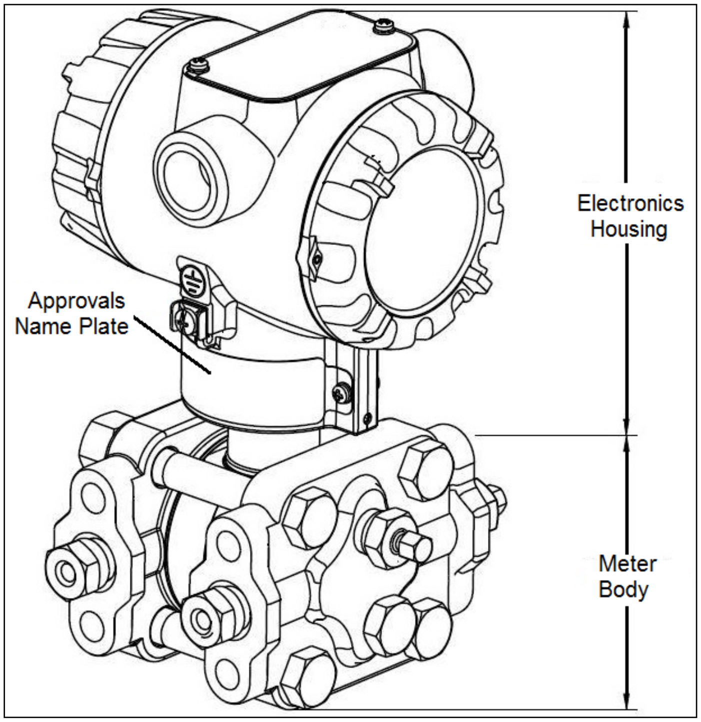


Figure 1 – SMV 800 Major Assemblies

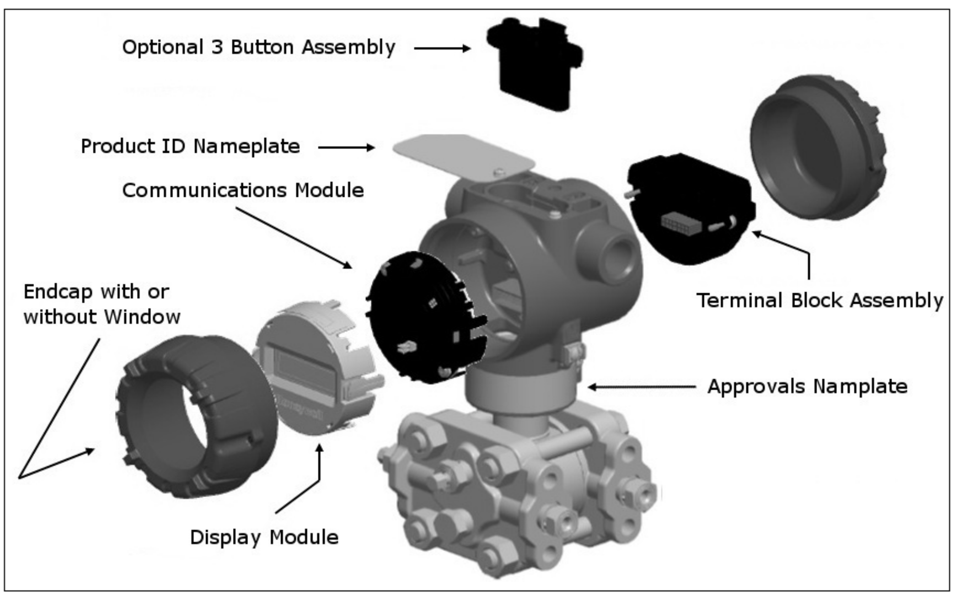


Figure 2 – Electronics Housing Components

1.2.2 Functional Characteristics

The SMV 800 SmartLine MultiVariable transmitter measures Differential Pressure, Static Pressure (Absolute or Gauge), and Process Temperature. These measurements are used to calculate volumetric or mass flow rates. The measured values and calculated flow may be read by a connected Host. Available communications protocols include Honeywell Digitally Enhanced (DE) and HART. Output options include Digital and 4-20 mA Analog.
The SMV800 measures Process Temperature from an external RTD or Thermocouple.
The device may be configured to map any of the four Process Variable to the Analog Output (4-20 mA):

- Differential Pressure PV1
- Static Pressure PV2
- Process Temperature PV3
- Calculated Flow Rate PV4

An optional 3-button assembly is available to set up and configure the transmitter via the Display. In addition, a Honeywell MCT404/MCT202 Toolkit is available for configuration of HART models. The SCT Smartline Configuration Tool (not supplied with the Transmitter) can facilitate setup and configuration for DE devices.
Certain adjustments can be made through an Experion Station or a Universal Station if the Transmitter is digitally integrated with Honeywell's Experion or TPS/TDC 3000 control system.

1.3 Series, Model and Number

The Transmitter nameplate mounted on the top of the Electronics Housing (see Figure 2) lists the model number, physical configuration, electronics options, accessories, certifications, and manufacturing specialties.
Figure 3 is an example of a typical SMV 800 Transmitter name plate.
The model number format consists of a Key Number with several table selections.

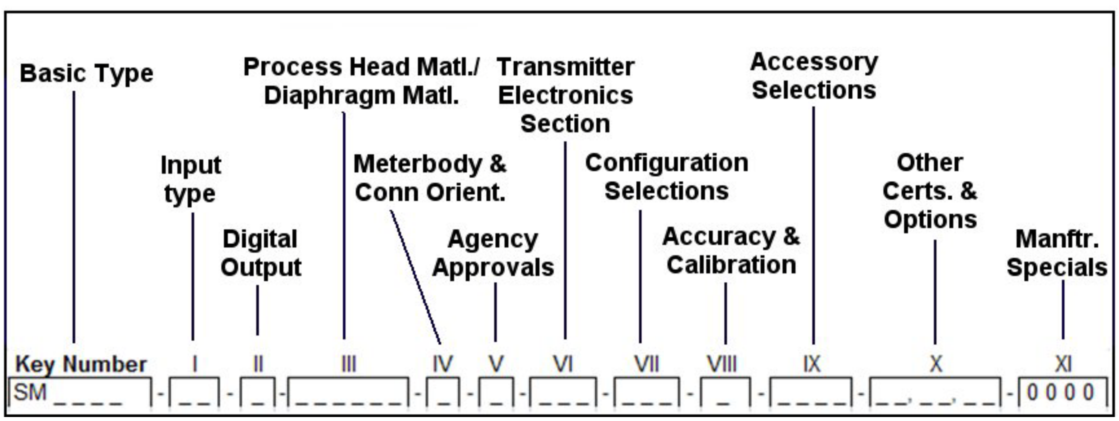


Figure 3 –Typical Name Plate Information

You can readily identify the series and basic Transmitter type from the third and fourth digits in the key number. The letter in the third digit represents one of these basic measurement types for the Static Pressure:

- A = Absolute Pressure
- G = Gauge Pressure

For a complete selection breakdown, refer to the appropriate Specification and Model Selection Guide provided as a separate document.

1.4 Safety Certification Information

An "approvals" name plate is located on the bottom of the Electronics Assembly; see

Figure 1 for exact location. The approvals name plate contains information and service marks that disclose the Transmitter compliance information. Refer to Appendix C of the *SMV 800 SmartLine Transmitters User's Manual*, document number 34-SM-25-03 for details.

1.5 Transmitter Adjustments

Zero and Span adjustments are possible in new generation SMV 800 SmartLine Multivariable Transmitters by using the optional three-button assembly located at the top of the Electronic Housing (see Figure 2). However, certain capabilities are limited in the following configurations:

- Without a display – Zero and Span setting only for HART and DE devices.
- With a display – Complete Transmitter configuration is possible for HART and DE devices.

You can also use the Honeywell MCT404 Configuration Tool – FDC application to make any adjustments to an SMV 800 Transmitter with HART.
For DE models the SCT3000 PC tool application can be used to configure the device.
Certain adjustments can also be made through the Experion or Universal Station if the Transmitter is digitally integrated with a Honeywell Experion or TPS system.

SMV 800 HART models can be configured using Honeywell tools such as Experion in conjunction with FDM, using DTMs running in FDM or Pactware, or Emerson 375 or 475.

1.6 Local Display Options

The SMV 800 Multivariable Transmitter has an Advanced display; see Table 2.

Table 2 – Available Display Characteristics

Advanced Display	• Screen Format o Large process variable (PV) o PV with bar graph o PV with trend (1-24 hours, configurable) • PV Selection • Display Units • Decimals • PV Scaling • Scaling Low • Scaling High • Display Low Limit • Display High Limit • Custom Unit • Custom Tag • Trend Duration (h) • Language o EN, FR, GE, SP, RU, IT & TU o EN, CH (Kanji), JP • PV Rotation, • Sequence Time (sec)

1.7 Optional 3-Button Assembly

The optional 3-button assembly provides the following features:

- Opportunity for immediate reaction with minimal disruptions
- Improved maintenance time
- Potential savings on hand-held units
- Suitable for all environments: hermetically sealed for long life in harsh environments
- Suitable for use in all electrical classifications (flameproof, dustproof, and intrinsically safe)

The 3-button assembly is externally accessible and provides the following capabilities:

- Menu-driven configuration with optional display:
  - Using increment, decrement & enter keys
  - A comprehensive on screen menu guides the way
  - Configure the transmitter
  - Configure the display
  - Set zero and span
- Zero and span settings without optional display

2 Communication Modes

2.1 Overview

The SMV 800 SmartLine Multivariable Transmitter is available with either Honeywell's Digitally Enhanced (DE) or HART revision 7 communications protocols. This manual addresses the processes to configure and calibrate a Transmitter for DE and HART communication..

2.2 DE Mode Communication

The SMV 800 can transmit its output in either an analog 4 to 20 milliampere format or a Digitally Enhanced (DE) protocol format for direct digital communications with our TPS/TDC 3000 control system. In the analog format, only a selected variable is available as an output which can be any one of the following:

- Differential Pressure PV1,
- Static Pressure PV2,
- Process Temperature PV3, or
- Calculated Flow Rate PV4

Note that the secondary variable is only available as a read only parameter through the SCT shown in Figure 4.

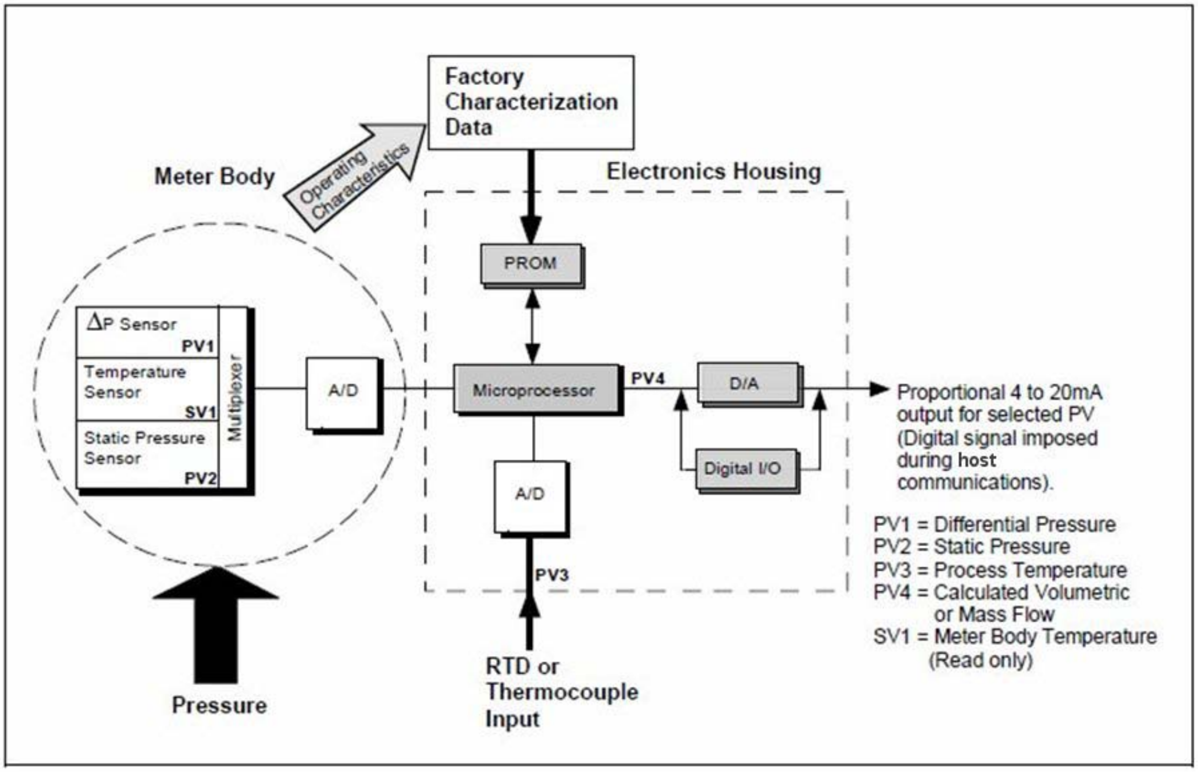


Figure 4 – DE Communication through SCT

In the digital DE protocol format, all four process variables are available for monitoring and control purposes; and the meter body temperature is also available as a secondary variable for monitoring purposes only - See Figure 4

The SMV 800 transmitter has no physical adjustments. You need an SCT to make any adjustments in an SMV 800 transmitter. Alternately, certain adjustments can be made through the Universal Station if the transmitter is digitally integrated with our TPS/TDC 3000 control system.

For more information see section **3.5 Smartline Configuration Toolkit (SCT 3000)**

Digitally Enhanced (DE) Mode Communication

⚠ Although it is unnecessary to put a control loop in manual mode before communicating with a Transmitter operating in DE mode, caution is required if there is potential for error in identifying the operating mode.

In DE mode, the PV is available for monitoring and control purposes.

Much of the operation in the Digitally Enhanced (DE) mode is similar to that of analog operation. The essential characteristics of DE transmitter are shown in Figure 4.

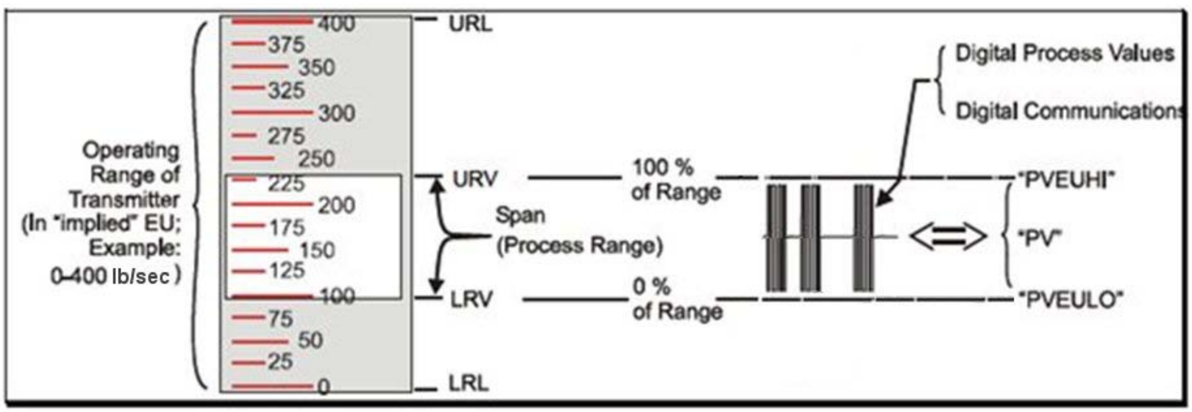


Figure 5 – DE Mode Value Scaling

As indicated at the right of Figure 5, output values of process variables, as well as communications are transferred to a receiving device digitally. The digital coding is Honeywell proprietary, which requires the use of DE-capable Honeywell control equipment.

The use of DE mode offers several advantages:

- **Process Safety:** Unlike analog mode, communications devices do not *bump* the PV value.
- **Accuracy:** requires less maintenance.
- **Digital communication:** Relatively immune to small variations in circuit resistance or supply voltage.
- **Facilitates Maintenance Tasks:** Honeywell control systems include operating displays that enable direct communication with transmitters operating in DE mode.

2.3 HART Mode Communication

⚠ When using MCT404,before connecting to a HART 7 transmitter, verify that the FDC application is used and not the MC Toolkit application. For DE models use the SCT3000 PC tool application.

- Transmitters with HART 7 capability have features that vary among manufacturers and with the characteristics of specific devices. The FDC software application executing on the MCT404/MCT202 supports the HART Universal, Common Practice and Device Specific Commands which are implemented in the Honeywell Transmitters.

As indicated in Figure 6, the output of a Transmitter configured for HART protocol includes two primary modes:

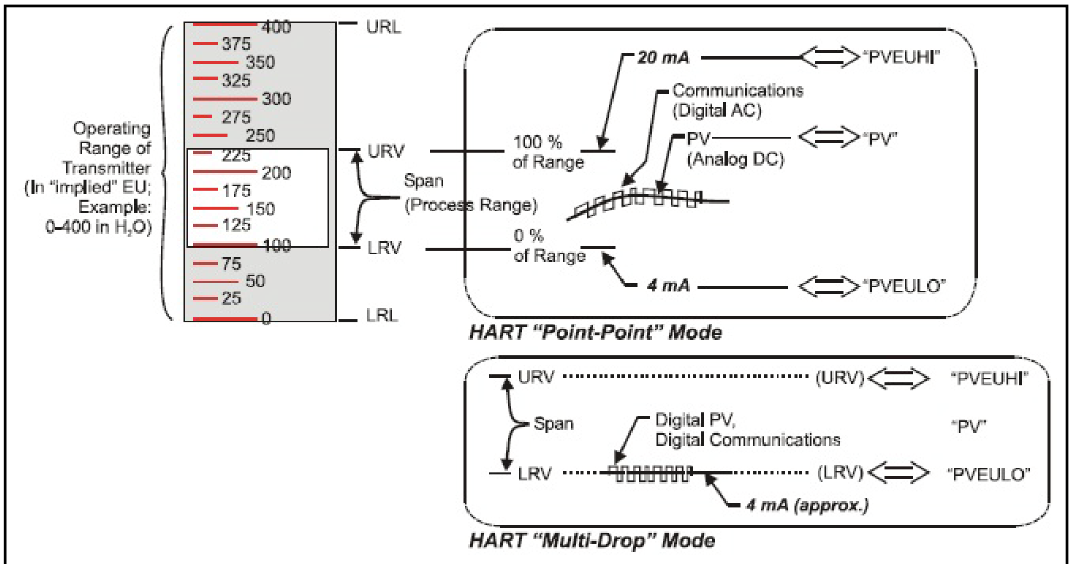


Figure 6 – HART Point-to-Point and Multi-drop Value Scaling

- Point-to-Point Mode, in which one Transmitter is connected via a two-conductor, 4-20 mA current loop to one receiver.
- Multi-Drop Mode, in which several Transmitters are connected through a two-conductor network to a multiplexed receiver device.

In point-to-point mode, the value of the primary Process Variable (PV) is represented by a 4-20 mA current loop, almost identical to that of a Transmitter operating in analog mode. In this case, however, the analog signal is modulated by Frequency Shift Keying (FSK), using frequencies and current amplitude that do not affect analog sensing at the receiver. The accuracy of the analog level must be precisely controlled for accurate sensing. HART communication will not *bump* process variables.
In multi-drop mode, up to 16 transmitters in HART 5 (addresses 0-15) and up to 64 transmitters in HART6/7 (addresses 0-63) can exist on the two-conductor network.

3 Configuration Tools and Interfaces

3.1 Overview

This section describes the tools and interfaces involved in configuring a new SMV 800 SmartLine Multivariable Transmitter for HART or DE communication operation. The information in this section also applies to adjusting the configuration of a Transmitter that has been in operation and updating one that is currently in operation.

3.2 Pre-requisites

The information and procedures in this manual are based on the assumption that personnel performing configuration and calibration tasks are fully qualified and knowledgeable in the use of the Honeywell MC Toolkit or MCT202/MCT404 and the PC tool SCT3000 application.
Furthermore, we assume that the reader is intimately familiar with the SMV 800 family of SmartLine Multivariable Transmitters and thoroughly experienced in the type of process application targeted for Transmitter deployment. Therefore, detailed procedures are supplied only in so far as necessary to ensure satisfactory completion of configuration tasks.

3.3 Application Design, Installation, Startup, and Operation

The *SMV 800 SmartLine Multivariable Transmitters User's Manual*, document number 34-SM-25-03, provides the details for application design, installation, and startup; see Table 3 for topics.

Table 3 – User Manual Related Topics

SMV 800 SmartLine Multivariable Transmitters Users Manual, 34-SM-25-03		
Section 2. Application Design	**Section 3. Installation and Startup**	**Section 4. Operation**
Safety Accuracy Diagnostics messages	Site evaluation, Toolkit issues Display installation concerns, Transmitter mounting, Piping & wiring, Startup tasks and procedures	Three-button option Failsafe direction setup Monitoring displays
Other sections include but not limited to: Section 5. Maintenance, Section 6. Calibration, Section 7 Troubleshooting, Section 8. Parts List, Appx. Certificates, Security Vulnerability		

3.3.1 Organization

This information in this section is arranged in the following sequence:

- MCT404 Toolkit operation in SMV 800 Transmitter HART Setup and Configuration:
  - Physical circuit connections
  - Application components
  - Configuration for Analog and HART operation
- SCT3000 operation in SMV 800 Transmitter DE Setup and Configuration:
  - Physical circuit connections
  - Application components
  - Configuration for DE operation
- SMV 800 Transmitter
  - Advanced displays
  - Health indications
  - Ability to be configured and operate in a process system

3.4 Toolkit Participation

Before using the MC Toolkit, be sure that you are aware of the potential consequences of each procedure, and that you use appropriate safeguards to avoid possible problems. For example, if the Transmitter is an element in a control loop, the loop needs to be put in manual mode, and alarms and interlocks (i.e., trips) need to be disabled, as appropriate, before starting a procedure.

3.4.2 Toolkit Software Applications

The MCT404 Toolkit – FDC software applications to work with SMV 800 HART Transmitters and the SCT3000 SmartLine Configuration tool for use configuring DE Transmitters:

- **MCT404 Toolkit Field Device Configurator (FDC)**. This application is used for configuring, calibrating, monitoring, and diagnosing HART devices. FDC conforms to the IEC 61804-3 EDDL (Electronic Data Description Language) standard specification. The FDC application is an open solution that supports devices with a registered device description (DD) file compatible with HART Communication Foundation (HCF) requirements.
- **SCT3000 tool.** This application is used for configuring, calibrating, monitoring, and diagnosing Honeywell Digitally Enhanced (DE) devices. For more information see section **3.5 Smartline Configuration Toolkit (SCT 3000)**

Details for working with the MC Toolkit are provided in the *MC Tookit User Manual*, document # 34-ST-25-50 (MCT404). In subsequent sections of this manual, explicit operating instructions are provided only in so far as necessary to complete required tasks and procedures. For SCT3000 application refer to User manual #34-ST-10-08

3.4.3 Configuration Databases

Both tools can be used to establish and/or change selected operating parameters in a Transmitter database.

3.4.4 Configuration

Configuration can be accomplished both online and offline with the Transmitter powered up and connected to the MC Toolkit. Online configuration immediately changes the Transmitter operating parameters. For offline configuration, Transmitter operating characteristics are entered into Toolkit memory for subsequent downloading to a Transmitter.

When you set up or configure a Transmitter, it can take up to 30 seconds for the value to be stored in it. If you change a value and Transmitter power is interrupted before the change is copied to nonvolatile memory, the changed value will not be moved to nonvolatile memory.

3.4.5 MC Toolkit–Transmitter Electrical/Signal Connections

Figure 7 displays how to connect the MC Toolkit directly to the terminals of a HART-only Transmitter.

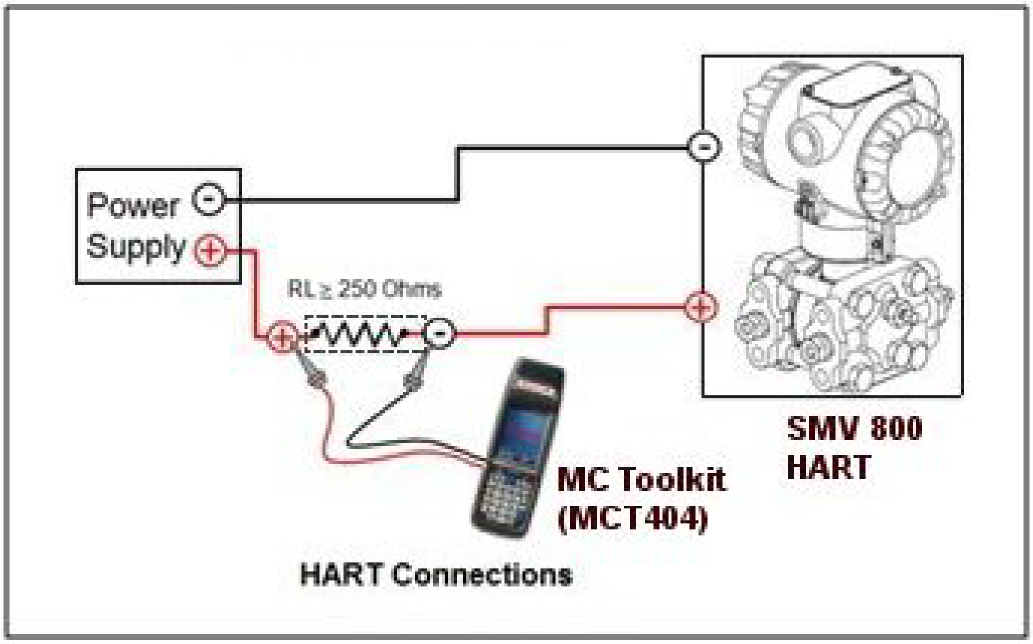


Figure 7 – MC Toolkit-Transmitter Electrical/Signal Connections

3.5 Smartline Configuration Toolkit (SCT 3000)

3.5.6 Smartline Configuration Toolkit for use with DE models

Honeywell's SCT 3000 Smartline Configuration Toolkit is a cost¬effective means to configure, calibrate, diagnose, and monitor the SMV 800 and other smart field devices. The SCT 3000 runs on a variety of Personal Computer (PC) platforms using Windows XP® and Window 7®. It is a bundled Microsoft Windows software and PC-interface hardware solution that allows quick, error-free configuration of SMV transmitters. Figure 8 shows the major components of the SCT 3000.

Some SCT 3000 features include:

- Preconfigured templates that simplify configuration and allow rapid development of configuration databases.
- Context-sensitive help and a comprehensive on-line user manual.
- Extensive menus and prompts that minimize the need for prior training or experience.
- The ability to load previously configured databases at time of installation.
- Automatic verification of device identification and database configuration menus and prompts for bench set up and calibration.
- The ability to save unlimited transmitter databases on the PC.

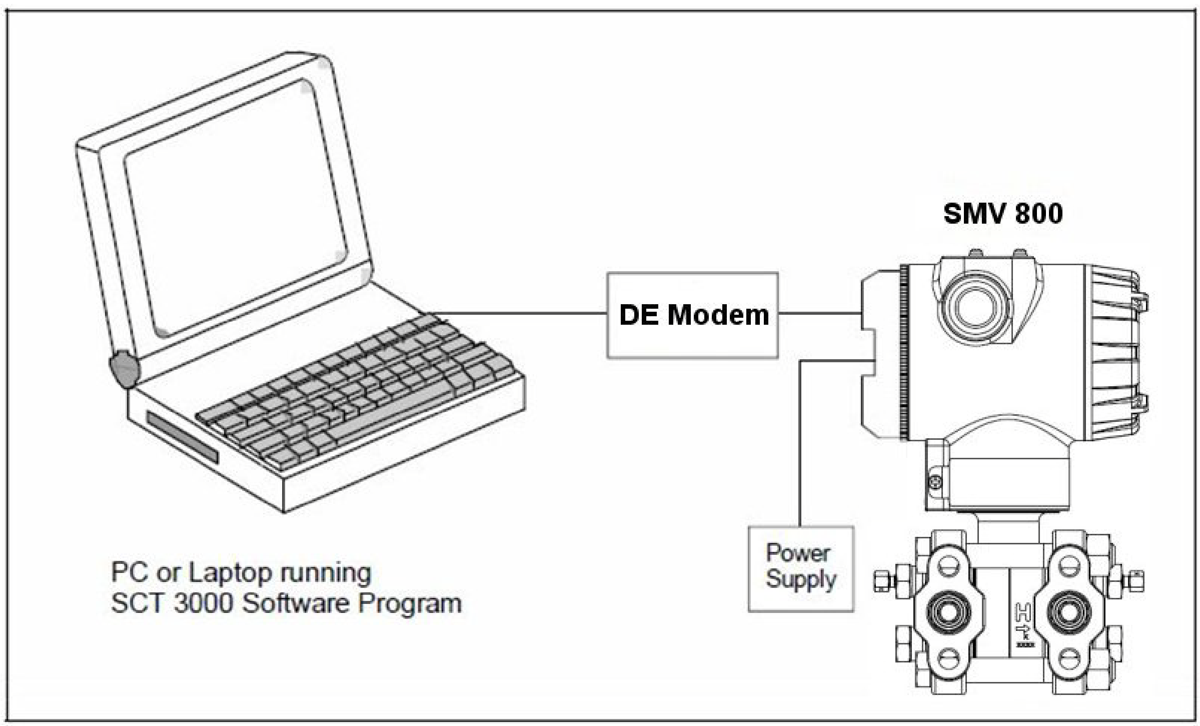


Figure 8 - Smartline Configuration Tool

3.6 Considerations for SCT 3000

3.6.7 SCT 3000 Requirements

The SCT 3000 consists of the PC application and the Honeywell DE Modem hardware interface used for connecting the host computer to the SMV transmitter.

Be certain that the host computer is loaded with the proper operating system necessary to run the SCT program.
See the SCT 3000 Smartline Configuration Toolkit Start-up and Installation Manual #34-ST-10-08 for complete details on the host computer specifications and requirements for using the SCT 3000.

4 Setting up Communications with the SCT3000

If you have never used an SCT to “talk” to an SMV 800 transmitter, this section tells you how to connect the SMV with the SCT, establish on-line communications and make initial checks.

ATTENTION
The SCT 3000 contains on-line help and an on-line user manual providing complete instructions for using the SCT to setup and configure SMV transmitters.

4.1 Establishing Communications

4.1.1 Off-line Versus On-line SMV Configuration

The SCT 3000 allows you to perform both off-line and on-line configuration of SMV transmitters.

- Off-line configuration does not require connection to the transmitter. By operating the SCT 3000 in the off-line mode, you can configure and save database files of an unlimited number of transmitters prior to receipt, , and then download the database files, save them either to portable media and then download the database files to the transmitters during commissioning.
- An on-line session requires that the SCT is connected to the transmitter and allows you to download previously-configured database files at any time during installation or commissioning of your field application. Note that you can also upload a transmitter’s existing configuration and then make changes directly to that database.

4.1.2 Off-line ConfigurationProcedures

Refer to the SCT User Manual (on-line) for detailed procedures on how to off-line configure SMV transmitters using the SCT 3000.

4.1.3 SCT Hardware Connections

A PC or laptop computer (host computer) which contains the SCT application is connected to the wiring terminals of the SMV transmitter and other smart field devices via the Honeywell DE Modem. Figure 9 shows the hardware components of the SCT.

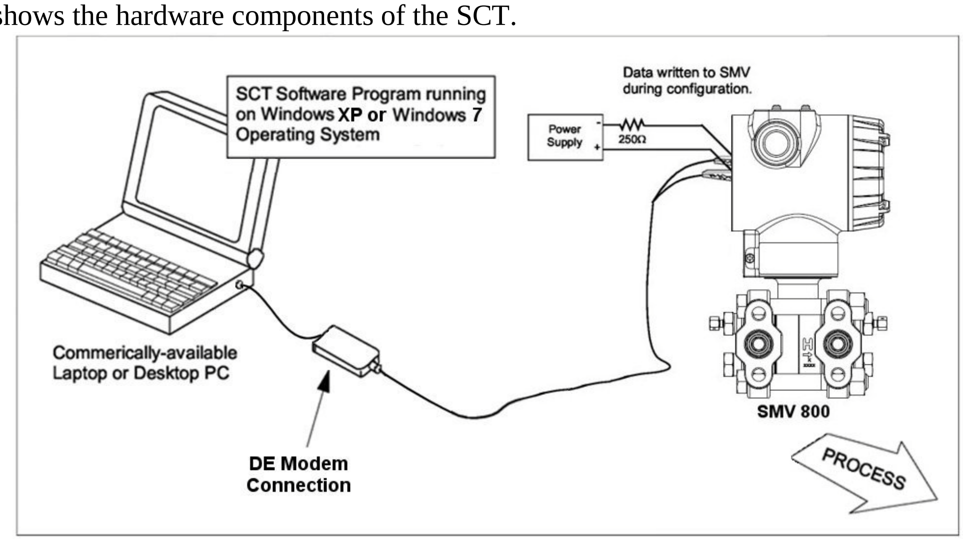


Figure 9 - SCT Hardware Components

ATTENTION Connecting the host computer to an SMV for on-line communications requires Smartline Option Module consisting of a DE Modem connection.

4.1.4 SCT 3000 On-line Connections to the SMV

Table 4 provides the steps to connect the assembled SCT 3000 hardware between the host computer and the SMV for on-line communications.

WARNING
When the transmitter's end-cap is removed, the housing is not explosionproof.

Table 4 - Making SCT 3000 Hardware Connections

Step	Action
1	With the power to the host computer turned off, connect the DE MODEM on the host computer. **ATTENTION** Honeywell has performance-qualified the following DE MODEM host adapters for use with the SCT: -- TMB-240 Single Slot Internal Front Panel Adapter -- TMB-250 Dual Slot Internal Front Panel Adapter -- GS-120 Greystone Peripherals, Inc. -- GS-320 Greystone Peripherals, Inc.
2	Remove the end-cap at the terminal block side of the SMV and connect the easy hooks or alligator clips at the end of the adapter cable to the respective terminals on the SMV as follows: • Connect the **red lead** to the **positive terminal.** • Connect the **black lead** to the **negative terminal.** **ATTENTION** The SCT 3000 can be connected to only **one** SMV at a time.

4.1.5 Establishing On-line Communications with the SMV

Table 5 lists the steps to begin an on-line session with the loop-connected SMV and upload the database configuration from the transmitter.

Table 5 - Making SCT 3000 On-line Connections

Step	Action
1	Make sure that 24V dc power is applied to the proper SMV transmitter SIGNAL terminals. For wiring details refer to the SMV 800 Transmitter User's manual for details (34-SM-25-03).
2	Apply power to the PC or laptop computer and start the SCT 3000 application.
3	Perform either step **4A** (recommended) or **4B** (but not both) to upload the current database configuration from the SMV.
4A	• Select **Tag ID** from the **View Menu** (or click on the **Tag ID toolbar button)** to access the **View Tag dialog box.** **--** If the SCT 3000 detects that the transmitter is in analog mode, a dialog box displays prompting you to put the loop in manual and to check that all trips are secured (if necessary) before continuing. Click **OK** to continue. -- After several seconds, the SCT 3000 reads the device's **tag ID** and displays it in the **View Tag dialog box.** • Click on the **Upload button** in the **View Tag dialog box** to upload the current database configuration from the SMV and make the on-line connection. -- A **Communications Status dialog box** displays during the uploading process.
4B	Select **Upload** from the **Device Menu** (or click on the **Upload toolbar button)** to upload the current database configuration from the SMV and make the on-line connection. -- If the SCT 3000 detects that the transmitter is in analog mode, a dialog box displays prompting you to put the loop in manual and to check that all trips are secured (if necessary) before continuing. Click **OK** to continue. -- A **Communications Status dialog box** displays during the uploading process.
5	When the on-line view of the SMV appears on the screen, access the **Status form** by clicking on its tab. The **Status form** is used to verify the status of the connected field device. • Separate list boxes for **Gross Status** and **Detailed Status** are presented in the **Status form.** Refer to the **SCT 3000 User Manual** (on-line) for explanations of each status condition.
6	Refer to the **SCT 3000 User Manual** (on-line) for a procedure on how to download any previously-saved configuration database files.

4.1.6 Checking Communication Mode and Firmware Version

Before doing anything else, it is a good idea to confirm the transmitter's mode of operation and identify the version of firmware being used in the transmitter.

- Communication mode (either ANALOG or DE mode) is displayed on the Status Bar at the bottom SCT application window.
- The transmitter's firmware version is displayed on the Device configuration form

4.1.7 DE Communication

A transmitter in the digital (DE) mode can communicate in a direct digital
Mode fashion with a Universal Station in Honeywell's TPS and TDC 3000 control systems. The digital signal can include all four transmitter process variables and its secondary variable as well as the configuration database.

4.1.8 Changing Communication Mode

You can select the mode you want the transmitter to communicate with the control system. The communication mode is selected in the SCT General Configuration form tab card.

5 DE Transmitter Configuration

5.1 Configuration Personnel Requirements

The configuration processes in this section reflect the assumption that you will use the Honeywell SCT3000 Configuration Tool to configure an SMV 800 SmartLine DE Transmitter.

The other tools that support DE Transmitter configuration are Honeywell's Experion or TPS/ TDC 3000.

5.2 Configuration using the SCT3000

This section introduces you to SMV 800 transmitter configuration.
It identifies the parameters that make up the transmitter's configuration database and provides information for entering values/selections for the given configuration parameters using the SCT.

ATTENTION
Please verify that you have the SCT software version that is compatible with your SMV 800.

To check the software version, connect an SCT to the transmitter.
Using the SCT: Perform Upload of the SMV database to the SCT. The SMV firmware version can be read from the Device tab card.
To check the SCT software version, select About SCT from the Help pull down menu. The software version will be displayed.

5.2.1 SCT On-line Help and User Manuals

IMPORTANT: While the information presented in this section refers to SMV 800 transmitter configuration using the SCT 3000 application (Ver. 6.18.445 or above). The SCT on-line manual and help topics contain complete information and procedures on SMV 800 configuration and should be followed to properly configure the transmitter.

This section of the manual should be viewed as subordinate to the SCT on-line manual and if inconsistencies exist between the two sources, the SCT on-line manual will prevail.

5.3 About Configuration

Each SMV 800 Transmitter includes a configuration database that defines its particular operating characteristics. You use the SCT 3000 to enter and change selected parameters within a given transmitter's database to alter its operating characteristics. We call this process of viewing and/or changing database parameters "configuration".

SMV configuration can be done using the SCT either on-line, where configuration parameters are written to the SMV through a direct connection with the SCT, or off-line where the transmitter configuration database is created and saved to disk for later downloading to the SMV. Figure 10 shows a graphic summary of the on-line configuration process.

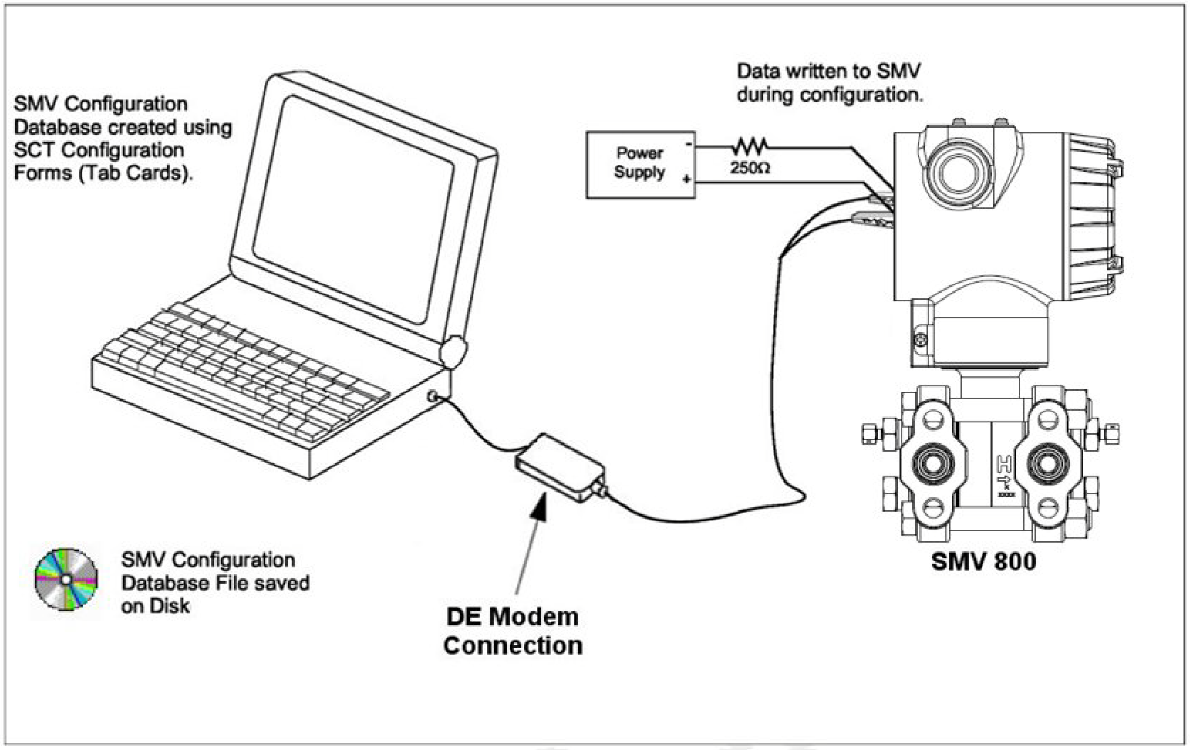


Figure 10 - SMV On-line Configuration Process

5.3.2 Configuration Summary

The SCT contains templates that you can use to create configuration database for various smart field devices. The SMV templates contain the configuration forms (or tab cards) necessary to create the database for an SMV transmitter.

When using a Honeywell-defined SMV template, you should choose a file template for the temperature range and model of SMV that you wish to configure.

Configuration is complete when you have entered all parameters in the template's tab cards, (and for flow applications you have entered all flow data in the flow compensation wizard). You then save the template file containing the SMV transmitter's database as a disk file.

5.4 Using the SCT for SMV 800 Configuration

The SCT template files have tab cards that contain data fields for the SMV parameters which you fill in. You start with the Device tab card to enter the device tag name (Tag ID) and other general descriptions. Next, you can select each tab card in order and configure each PV (PV1, secondary variable if desired, PV2, PV3, and PV4).

SMV Process Variable	SCT Template Tab Card
PV1 (Differential Pressure)	DPConf
PV2 (Absolute Pressure or Gauge Pressure) *	APConf or GPConf *
PV3 (Process Temperature)	TempConf
PV4 (Flow)	FlowConf

* PV2 will be AP or GP depending on SMV model

Use the Flow Compensation Wizard to setup the SMV 800 for flow applications. The flow wizard guides you through the steps necessary to complete your flow configuration. See Flow Compensation Wizard, section 5.5.10 for more information about the flow wizard.

In the subsections below information is given for filling in some of the SCT tab card data fields. Supplementary background information and reference data on SMV configuration that may be helpful is also presented. Use the SCT on-line help and user manual for detailed “how to configure” information.

ATTENTION
If the transmitter detects an incomplete database upon power-up, it will initialize the database parameters to default conditions. A setting or selection with a superscript “[d]” in the following subsections identifies the factory setting.

5.5 Device Configuration

5.5.3 Transmitter Tag Name and PV1 Priority

Tag ID field is found on the Device tab card.
Tag ID - Enter an appropriate tag name for the transmitter containing up to eight ASCII characters which uniquely identifies the transmitter.
NOTE: It is suggested that when you create a database configuration file for the transmitter, you make the file name the same as the transmitter tag ID.

PV1 Priority - Enter "/ " slash as the eighth character in tag number to set PV 1 as "priority" PV in DE (digital) data broadcast, if all four PVs are selected for broadcast (turned ON). See "Selecting PVs for Broadcast" on next page for an explanation on the broadcast of PVs.

Background
Normally, PV1 has the number 1 priority unless all four PVs are selected for broadcast. Then, PV4 has the number 1 priority, PV 1 is second, PV2 is third, and PV3 is fourth. However, you can set PV1 to have the top priority and PV4 to be second by entering a "/" as the eighth character in the Tag ID. Note that the transmission rate for the various PVs depends on the number of PVs that are selected for broadcast. When more than one PV is selected, the "priority" PV is sent every other broadcast cycle.

Device Data Fields
See the SCT help and on-line user manual for descriptions and procedures for filling in the remaining data fields of the Device tab card.

5.5.4 *General* Configuration

PV Type
The PV Type field is found on the General tab card.

Selecting PVs for Broadcast
Select one of the PV Types in Table 6 to choose which of the transmitter's PVs are to be sent (broadcast) to the control system. Optionally, you can select whether the secondary variable (SV1) is included as part of the broadcast message. The secondary is the SMV transmitter's meter body temperature.
NOTE: This configuration parameter is valid only when the transmitter is in DE mode.

Table 6 - PV Type Selection for SMV Output

If You Select PV Type . . .	These PVs are Broadcast to Control System
PV1 (DP)	Differential Pressure (PV1) measurement.
PV1 (DP) and PV2 (SP)	Differential Pressure (PV1) and Static Pressure* (PV2) measurements.
PV1 (DP) - PV3 (TEMP)	Differential Pressure (PV1), Static Pressure* (PV2) and Process Temperature (PV3) measurements.
PV1 (DP) - PV4 (FLOW)	Differential Pressure (PV1), Static Pressure* (PV2) and Process Temperature (PV3) measurements and the Calculated flow rate value (PV4).

PV1 (DP) w/SV1 (M.B.Temp)	Differential Pressure (PV1) measurement with the Secondary Variable (SV1).
PV1 (DP) w/SV1 & PV2 (SP)	Differential Pressure (PV1) and Static Pressure* (PV2) measurements with the Secondary Variable (SV1).
PV1 (DP) w/SV1 - PV3 (TEMP)	Differential Pressure (PV1), Static Pressure* (PV2) and Process Temperature (PV3) measurements with the Secondary Variable (SV1).
PV1 (DP) w/SV1 - PV4 (FLOW)	Differential Pressure (PV1), Static Pressure* (PV2) and Process Temperature (PV3) measurements and the Calculated flow rate value (PV4) with the Secondary variable (SV1).

* Static pressure may be absolute or gauge pressure, depending on the SMV model type. (For models SMA810 and SMA845, PV2 measures absolute pressure. For model SMG870, PV2 measures gauge pressure.)

ATTENTION
To digitally integrate the SMV 800 transmitter with our TPS/TDC control systems, you must have an STIMV IOP module in your Process Manager, Advanced Process Manager, or High Performance Process Manager. You can not integrate the SMV 800 with a control system using an STDC card or an STI IOP module for the Smart Transmitter interface.
Contact your Honeywell representative for information about possibly upgrading an existing STI IOP to an STIMV IOP.

Analog Output Selection
The Analog Output Selection field should contain the PV type that will represent the transmitter’s output when the transmitter is in its analog mode.

Select the PV you want to see as the SMV output from the choices in Table 7.

Table 7 - SMV Analog Output Selection

Determine which PV is desired as SMV Output . . .	Then Select…
PV1 – Delta P (Differential Pressure)	PV1 (DP)
PV2 – Static (Absolute or Gauge Pressure)	PV2 (SP)*
PV3 – Proc Temp (Process Temperature)	PV3 (Temp)
PV4 – Calculated (Calculated Flow Rate)	PV4 (Flow)[d]

d Factory setting. * Static pressure may be absolute or gauge pressure, depending on the SMV model type. (For models SMA810 and SMA845, PV2 measure absolute pressure. For model SMG870, PV2 measures gauge pressure.)

A transmitter output can represent only one process variable when it is operating in its analog mode. You can select which one of the four PVs is to represent the output.

Line Filter (DE only)
When using the process temperature (PV3) input, select the input filter frequency that matches the power line frequency for the power supply.

- 50 Hz
- 60 Hz [d]

[d] Factory setting.

The line filter helps to eliminate noise on the process temperature signal input to the transmitter. Make a selection to indicate whether the transmitter will work with a 50 Hz or 60 Hz line frequency.

5.5.5 DPConf Configuration - PV1

Engineering Units
The DPConf tab card displays the Lower Range Value (LRV), Low Range Limit (LRL), Upper Range Value (URV) and Upper Range Limit (URL) for PV 1 in the unit of measure selected in the Engineering Units field.

PV1 Engineering Units
Select one of the preprogrammed engineering units in Table 8 for display of the PV measurement.

Table 8 - Pre-programmed Engineering Units for PV 1

Engineering Unit	Meaning
inH2O @ 39F d	Inches of Water at 39.2 °F (4 °C)
inH2O @ 68F	Inches of Water at 68 °F (20 °C)
mmHg @ 0C	Millimeters of Mercury at 0°C (32 °F)
psi	Pounds per Square Inch
kPa	Kilopascals
M Pa	Megapascals
mbar	Millibar
bar	Bar
g/cm^2	Grams per Square Centimeter
Kg/cm^2	Kilograms per Square Centimeter
inHg @ 32F	Inches of Mercury at 32 °F (0 °C)
mmH2O @ 4C	Millimeters of Water at 4°C (39.2 °F)
mH2O @ 4C	Meters of Water at 4 °C (39.2 °F)
ATM	Normal Atmospheres
inH2O @ 60F	Inches of Water at 60 °F (15.6 °C)

LRV and URV
The Lower Range Value and the Upper Range Value fields for PV1 are found on the *DPConf* tab card.

PV1 (DP) Range Values
Configure the LRV (which is the process input for 4 mA dc* (0%) output) and URV (which is the process input for 20 mA dc* (100%) output) for the differential pressure input PV1 by typing in the desired values on the SCT configuration .

- LRV = Type in the desired value (default = 0.0)
- URV = Type in the desired value

(default = 100 inH2O@39.2 °F for SMV models SMA845 and SMG870)
(default = 10 inH2O@39.2 °F for SMV models SMA810)

When transmitter is in analog mode.

- SMV 800 Transmitters are calibrated with inches of water ranges using inches of water pressure referenced to a temperature of 39.2 °F (4 °C).
- For a reverse range, enter the upper range value as the LRV and the

lower range value as the URV. For example, to make a 0 to 50 inH2O
range a reverse range, enter 50 as the LRV and 0 as the URV.

- The URV changes automatically to compensate for any changes in the

LRV and maintain the present span (URV – LRV).

- If you must change both the LRV and URV, always change the LRV first.

Output Conformity
Select the output form for differential pressure (PV1) variable to represent one of these selections. Note that calculated flow rate process variable (PV4) includes a square root operation and it is not affected by this selection.

- LINEAR
- SQUARE ROOT

d Factory setting.

Background
The PV1 output is normally set for a straight linear calculation since square root is performed for PV4. However, you can select the transmitter's PV 1 output to represent a square root calculation for flow measurement. Thus, we refer to the linear or the square root selection as the output conformity or the output form for PV 1.

About Square Root
For SMV 800 transmitters measuring the pressure drop across a primary
Output element, the flow rate is directly proportional to the square root of the differential pressure (PV 1) input. The PV 1 output value is automatically converted to equal percent of root DP when PV 1 output conformity is configured as square root.

You can use these formulas to manually calculate the percent of flow for comparison purposes.

$$\cdot 100 = \%P$$

Where, ΔP = Differential pressure input in engineering units

Span = Transmitter's measurement span (URV – LRV)

%P = Pressure input in percent of span

Therefore, $$\sqrt{\frac{\%P}{100}} \cdot 100 = \%\ Flow$$

And, you can use this formula to determine the corresponding current output in milliamperes direct current.

$$(\%\ Flow \cdot 16) + 4 = mA\ dc\ Output$$

Example: If you have an application with a differential pressure range of
0 to 100 inches of water with an input of 49 inches of water, substituting into the above formulas yields:

$$\frac{49}{100} \cdot 100 = 49\%$$

$$\sqrt{\frac{49\%}{100}} \cdot 100 = 70\%\ \text{Flow, and}$$

$$70\% \cdot 16 + 4 = 15.2\ mA\ dc\ Output$$

Square Root Dropout

To avoid unstable output at PV1 readings near zero, the SMV 800 transmitter automatically drops square root conformity and changes to linear conformity for low differential pressure readings. As shown in Figure 11, the square root dropout point is between 0.4 and 0.5 % of differential pressure input.

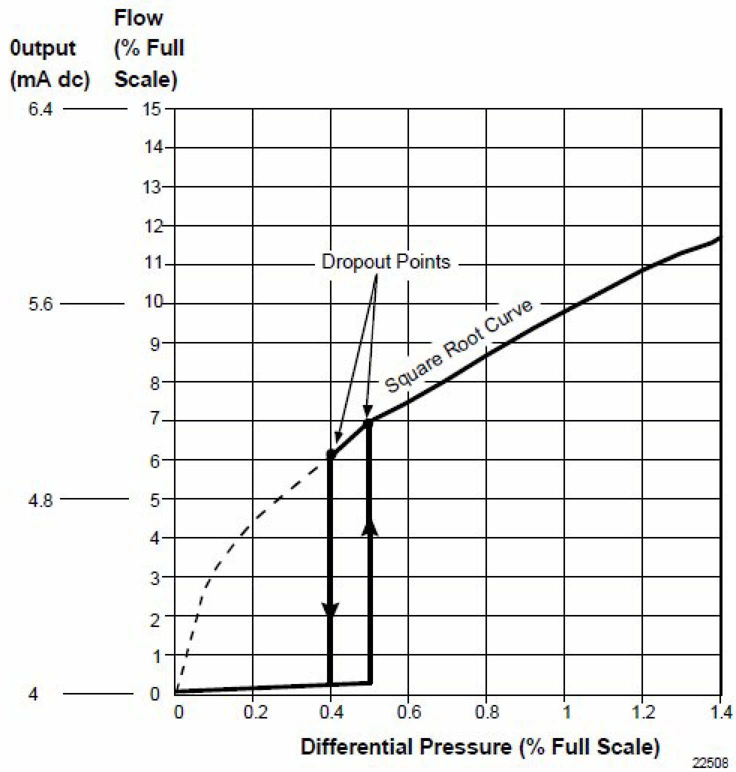


Figure 11 - Square Root Dropout Points for PV 1

Damping

Adjust the damping time constant for Differential Pressure (PV1) to reduce the output noise. We suggest that you set the damping to the smallest value that is reasonable for the process.

The damping values (in seconds) for PV1 are:

0.00d, 0.16, 0.32, 0.48,
1.0, 2.0, 4.0, 8.0, 16.0, and 32.0

Adjust the damping time to reduce the output noise. We recommend that you set the damping to the largest value that the system can accept.

Background

The electrical noise effect on the output signal is partially related to theturndown ratio of the transmitter. As the turndown ratio increases, thepeak-to-peak noise on the output signal increases. You can use thisformula to find the turndown ratio using the pressure range informationfor your transmitter.

$$\text{Turndown Ratio} = \frac{\text{Upper Range Limit}}{(\text{Upper Range Value} - \text{Lower Range Value})}$$

Example: The turndown ratio for a 400 inH_2O transmitter with a range of 0 to 50 inH_2O would be:

$$\text{Turndown Ratio} = \frac{400}{(50-0)} = \frac{8}{1} \text{ or } 8{:}1$$

5.5.6 *SP Conf* Configuration - PV2

Engineering Units

The SP Conf tab card displays the Lower Range Value (LRV), Lower Range Limit (LRL), Upper Range Value (URV) and Upper Range Limit (URL) for PV2 in the unit of measure selected in the Engineering Units field.

Table 9 - Pre-programmed Engineering Units for PV2*

Engineering Unit	Meaning
inH2O @ 39F	Inches of Water at 39.2 °F (4 °C)
inH2O @ 68F	Inches of Water at 68 °F (20 °C)
mmHg @ 0C	Millimeters of Mercury at 0°C (32 °F)
psi d	Pounds per Square Inch
kPa	Kilopascals
M Pa	Megapascals
mbar	Millibar
bar	Bar
g/cm^2	Grams per Square Centimeter
Kg/cm^2	Kilograms per Square Centimeter
inHg @ 32F	Inches of Mercury at 32 °F (0 °C)
mmH2O @ 4C	Millimeters of Water at 4°C (39.2 °F)
mH2O @ 4C	Meters of Water at 4 °C (39.2 °F)
ATM	Normal Atmospheres
inH2O @ 60F	Inches of Water at 60 °F (15.6 °C)

[d] Factory setting.

* Static pressure may be absolute or gauge pressure, depending on the SMV model type.

NOTE: Depending on the SMV transmitter model type, PV2 will measure static pressure in either absolute or gauge values.

SMV Models —SMA810 and SMA845 PV2 —Absolute Pressure
—STG870 PV2 —Gauge Pressure

PV2 Engineering Units. Select one of the preprogrammed engineering units in Table 13 for display f the PV2 measurements.

Atmospheric Offset

For SMV models SMG870, (which uses gauge pressure as PV2 input), you must measure the absolute static pressure and then enter that value in the Atmospheric Offset field.

Background

Internally, the SMV transmitter uses absolute pressure values for all flow calculations. The value entered in the Atmospheric Offset field is added to the gauge pressure input value to approximate the absolute pressure.

An inaccurate atmospheric pressure offset value will result in a small error of the flow calculation.

Use an absolute pressure gauge to measure the correct atmospheric pressure. A standard barometer may not give an accurate absolute pressure reading.

PV2 (AP/GP or SP) Range Values (LRV and URV)
The Lower Range Value and the Upper Range Value fields for PV2 are found on the AP/GPConf tab card.

Set the LRV (which is the process input for 0% output) and URV (which is the process input for 100% output) for the static pressure input PV2 by typing in the desired values on the SCT tab card.

- LRV = Type in the desired value (default = 0.0)
- URV = Type in the desired value
  (default = 50 psia for model SMA810) (default = 750 psia for model SMA845) (default = 3000 psig for model SMG870)

NOTE: Static pressure may be absolute or gauge pressure, depending on the model SMV 800 you have selected.

ATTENTION
The range for PV2 is static pressure (as measured at the high pressure port of the meter body).

- The URV changes automatically to compensate for any changes in the LRV and maintain the present span (URV – LRV).
- If you must change both the LRV and URV, always change LRV first.

Damping
Adjust the damping time constant for Static Pressure (PV2) to reduce the output noise. We suggest that you set the damping to the smallest value that is reasonable for the process. The damping values (in seconds) for PV2 are:

0.00d, 0.16, 0.32, 0.48,
1.0, 2.0, 4.0, 8.0, 16.0, and 32.0

Adjust the damping time to reduce the output noise. We recommend that you set the damping to the largest value that the system can accept.

5.5.7 *TempConf* Configuration - PV3

Engineering Units
The TempConf tab card displays the Lower Range Value (LRV), Lower Range Limit (LRL), Upper Range Value (URV) and Upper Range Limit (URL) for PV3 in the unit of measure selected in the Engineering Units field.

Selecting PV3 Engineering Units
Select one of the preprogrammed engineering units in Table 10 for display of the PV3 measurements, depending upon output characterization configuration.

Also select one of the preprogrammed engineering units for display of the cold junction temperature readings (CJT Units field). This selection is independent of the other sensor measurements. See Cold Junction Compensation on next page.

Table 10 - Pre-programmed Engineering Units for PV3

Engineering Unit	Meaning
C [d]	Degrees Celsius or Centigrade
F	Degrees Fahrenheit
K	Kelvin
R	Degrees Rankine
NOTE: When output characterization configuration for PV3 is NON-LINEAR (DE only), see Output Characterization. PV3 input readings are displayed in the following units:	
mV or V	milliVolts or Volts (for Thermocouple sensor)
Ohm	Ohms (for RTD sensor)

[d] Factory setting.

Cold Junction Compensation
If a thermocouple is used for process temperature PV3 input, you must
select if the cold junction (CJ) compensation will be supplied internally by the transmitter or externally from a user-supplied isothermal block.
Specify source of cold junction temperature compensation.

- Internal
- External - Must also key in value of cold junction temperature for reference.

Background
Every thermocouple requires a hot junction and a cold junction for operation. The hot junction is located at the point of process measurement and the cold junction is located in the transmitter (internal) or at an external location selected by the user. The transmitter bases its range measurement on the difference of the two junctions. The internal or external temperature sensitive resistor compensates for changes in ambient temperature that would otherwise have the same effect as a change in process temperature.

If you configure CJ source as external, you must tell the transmitter what cold junction temperature to reference by typing in the temperature as a configuration value. For internal cold junction configuration, the transmitter measures the cold junction temperature internally.

Output Linearization
For process temperature (PV3) input, configure output to represent this characterization

- Lineard - Output is in percent of temperature span.

Background
You can have the transmitter provide a linear output which is linearized to temperature for PV3 input, or a nonlinear output which is proportional to resistance for an RTD input, or millivolt or volt input for T/C input. Also, if you do switch from linear to unlinearized or vice versa, be sure you verify the LRV and URV settings after you enter the configuration data.

Sensor Type
Identify and select the type of sensor that is connected to the transmitter as its input for process temperature PV3. This will set the appropriate LRL and URL data in the transmitter automatically.

Table 11 shows the pre-programmed temperature sensor types and the rated measurement range limits for a given sensor selection.

Table 11 - Sensor Types for PV3 Process Temperature Input

Sensor Type	Rated Temperature Range Limits	
	°C	°F
PT100 D [d]	-200 to 450	-328 to 842
Type E	0 to 1000	32 to 1832
Type J	0 to 1200	32 to 2192
Type K	-100 to 1250	-148 to 2282
Type T	-100 to 400	-148 to 752

[d] Factory setting.

ATTENTION
Whenever you connect a different sensor as the transmitter's input, you must also change the sensor type configuration to agree. Otherwise, range setting errors may result.

T/C Fault Detect
Select whether to turn on the function for T/C or RTD fault detection.

- ON – Any RTD or T/C lead breakage initiates a critical status flag.
- OFF [d] – Break in RTD sensing lead or any T/C lead initiates a non critical status flag.

Background
You can turn the transmitter's temperature sensor fault detection function ON or OFF through configuration.

- With the detection ON, the transmitter drives the PV3 output to failsafe in the event of an open RTD or T/C lead condition. The direction of the failsafe indication (upscale or downscale) is determined by the failsafe jumper on the PWA.
- When fault detection is set to OFF, these same fault conditions result in the transmitter not driving the output to failsafe and reporting a non-critical status for an open RTD sensing lead or any T/C lead. But when an open RTD compensation lead is detected, the transmitter automatically reconfigures itself to operate without the compensation lead. This means that a 4-wire RTD would be reconfigured as 3-wire RTD, if possible and thus avoiding a critical status condition in the transmitter when the transmitter is still capable of delivering a reasonably accurate temperature output.

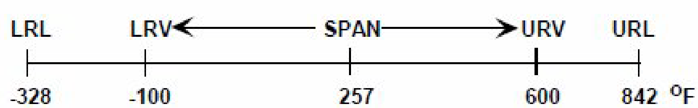
PV3 (Temperature) Range Values (LRV and URV)
The Lower Range Value and the Upper Range Value fields for PV3 are found on the TempConf tab card.

Configure the LRV and URV (which are desired zero and span points for your measurement range) for the process temperature input PV3 by typing in the desired values on the TempConf tab card.

- LRV = Type in the desired value (default = 0.0)
- URV = Type in the desired value (default = URL)

Background
You can set the LRV and URV for PV3 by either typing in the desired values on the SCT TempConf tab card or applying the corresponding LRV and URV input signals directly to the transmitter. The LRV and URV set the desired zero and span points for your measurement range as shown the example in Figure 12.

Typical RTD Range Configuration



Range Limits	Measurement Range	Lower Range Value	Upper Range Value	Span
-328 to 842 °F	-100 to 600 °F	-100 °F	600 °F	700 °F

Figure 12 – RTD Range Configuration

- For a reverse range, enter the upper range value as the LRV and the lower range value as the URV. For example, to make a 0 to 500 °F range a reverse range, enter 500 as the LRV and 0 as the URV.
- The URV changes automatically to compensate for any changes in the LRV and maintain the present span (URV – LRV). See Figure 13 for an example.
- If you must change both the LRV and URV, always change the LRV first. However, if the change in the LRV would cause the URV to exceed the URL, you would have to change the URV to narrow the span before you could change the LRV

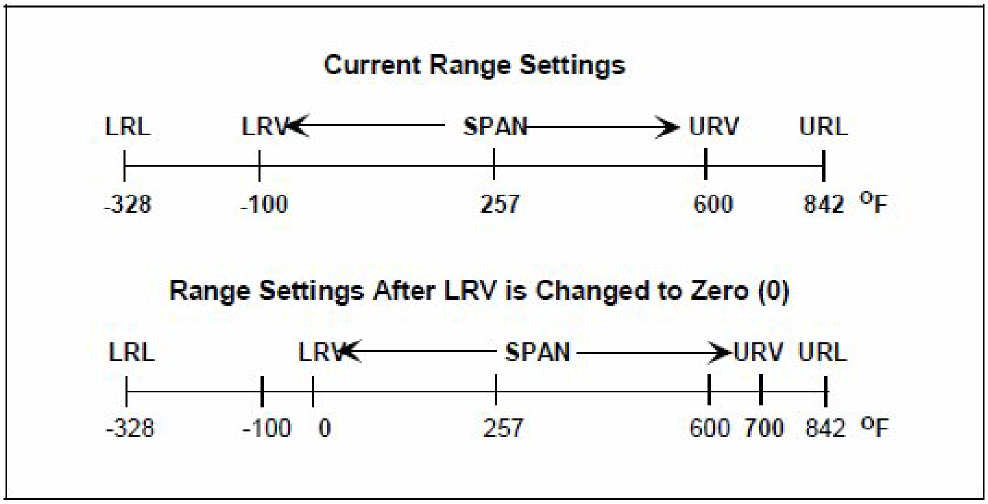


Figure 13 - Current Range Settings

Damping

Adjust the damping time constant for Process Temperature (PV3) to reduce the output noise. We suggest that you set the damping to the smallest value that is reasonable for the process.

The damping values (in seconds) for PV3 are:

0.00d, 0.3, 0.7, 1.5, 3.1, 6.3,
12.7, 25.5, 51.1, 102.3

Adjust the damping time to reduce the output noise. We recommend that you set the damping to the largest value that the system can accept.

5.5.8 *FlowConf* Configuration - PV4

Engineering Units

The FlowConf tab card displays the Lower Range Value (LRV), Lower Range Limit (LRL), Upper Range Value (URV) and Upper Range Limit (URL) for PV4 in the unit of measure selected in the Engineering Units field.

PV4 Engineering Units

Select one of the preprogrammed engineering units for display of the PV4 measurements, depending upon type of flow measurement configuration. Table 12 lists the pre-programmed engineering units for volumetric flow and Table 12 lists the engineering units for mass flow.

Table 12- Pre-programmed Volumetric Flow Engineering Units for PV4

Engineering Unit	Meaning
M^3/h[d]	Cubic Meters per Hour
gal/h	Gallons per Hour
l/h	Liters per Hour
cc/h	Cubic Centimeters per Hour
m^3/min	Cubic Meters per Minute
gal/min	Gallons per Minute
l/min	Liters per Minute
cc/min	Cubic Centimeters per Minute
m^3/day	Cubic Meters per Day
gal/day	Gallons per Day
Kgal/day	Kilogallons per Day
bbl/day	Barrels per Day
m^3/sec	Cubic Meters per Second
CFM *	Cubic Feet per Minute
CFH *	Cubic Feet per Hour

d Factory setting.

Table 13 - Pre-programmed Mass Flow Engineering Units for PV4

Engineering Unit	Meaning
Kg/sec	Kilograms per Second
Kg/min	Kilograms per minute
Kg/h	Kilograms per Hour
lb/min	Pounds per Minute
lb/h	Pounds per Hour
lb/sec	Pounds per Second
t/h[d]	Tonnes per Hour (Metric Tons)
t/min	Tonnes per Minute (Metric Tons)
t/sec	Tonnes per Second (Metric Tons)
g/h	Grams per Hour
g/min	Grams per Minute
g/sec	Grams per Second
ton/h	Tons per Hour (Short Tons)
ton/min	Tons per Minute (Short Tons)
ton/sec	Tons per Second (Short Tons)

[d] Factory setting.

PV4 (Flow) Upper Range Limit (URL) and Range Values (LRV and URV)

Set the URL, LRV, and URV for calculated flow rate PV4 output by typing in the desired values on the FlowConf tab card.

- URL = Type in the maximum range limit that is applicable for your process conditions. (100,000 = default)
- LRV = Type in the desired value (default = 0.0)
- URV = Type in the desired value (default = URL)

ATTENTION

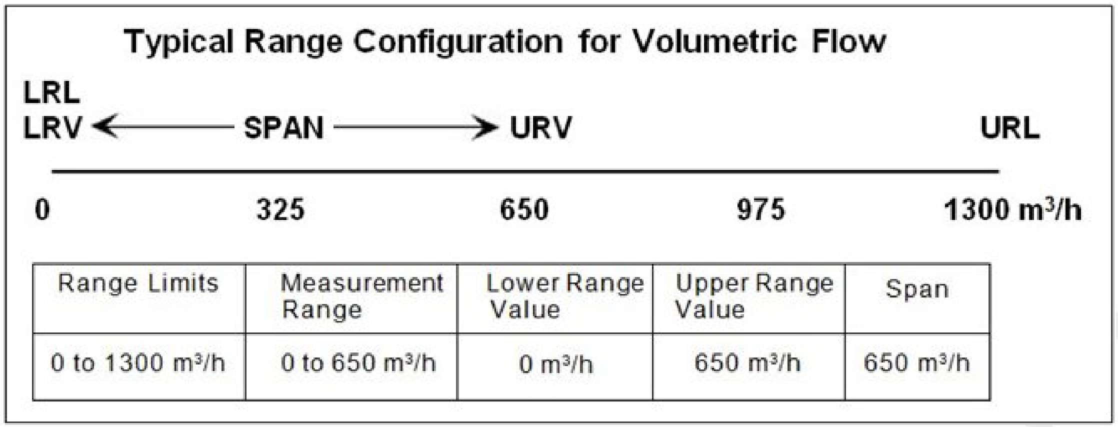
Be sure that you set the PV4 Upper Range Limit (URL) to desired value before you set PV4 range values. We suggest that you set the PV4 URL to equal two times the maximum flow rate (2 x URV)

About URL and LRL

The Lower Range Limit (LRL) and Upper Range Limit (URL) identify the minimum and maximum flow rates for the given PV4 calculation. The LRL is fixed at zero to represent a no flow condition. The URL, like the URV, depends on the calculated rate of flow that includes a scaling factor as well as pressure and/or temperature compensation. It is expressed as the maximum flow rate in the selected volumetric or mass flow engineering units.

About LRV and URV

The LRV and URV set the desired zero and span points for your calculated measurement range as shown in the example in Figure 14.



Range Limits	Measurement Range	Lower Range Value	Upper Range Value	Span
0 to 1300 m^3/h	0 to 650 m^3/h	0 m^3/h	650 m^3/h	650 m^3/h

Figure 14 - Typical Volumetric Flow Range Setting Values

ATTENTION

- The default engineering units for volumetric flow rate is cubic meters per hour and tonnes per hour is the default engineering units for mass flow rate.
- The URV changes automatically to compensate for any changes in the LRV and maintain the present span (URV – LRV).
- If you must change both the LRV and URV, always change the LRV first.

Damping

Adjust the damping time constant for flow measurement (PV4) to reduce the output noise. We suggest that you set the damping to the smallest value that is reasonable for the process.

The damping values (in seconds) for PV4 are:

0.00d, 0.5, 1.0, 2.0, 3.0, 4.0, 5.0,
10.0, 50.0 and100.0

Adjust the damping time to reduce the output noise. We recommend that you set the damping to the largest value that the system can accept.

Low Flow Cutoff for PV4

For calculated flow rate (PV4), set low and high cutoff limits between 0 and 30% of the upper range limit (URL) for PV4.

- Low Flow Cutoff: Low (0.0 = default) High (0.0 = default)

Background

You can set low and high low flow cutoff limits for the transmitter output based on the calculated variable PV4. The transmitter will clamp the current output at zero percent flow when the flow rate reaches the configured low limit and will keep the output at zero percent until the flow rate rises to the configured high limit. This helps avoid errors caused by flow pulsations in range values close to zero. Note that you configure limit values in selected engineering units between 0 to 30% of the upper range limit for PV4.

Figure 15 gives a graphic representation of the low flow cutoff action for sample low and high limits in engineering units of liters per minute.

ATTENTION
If the flow LRV is not zero, the low flow cutoff output value will be calculated on the LRV and will not be 0 %.

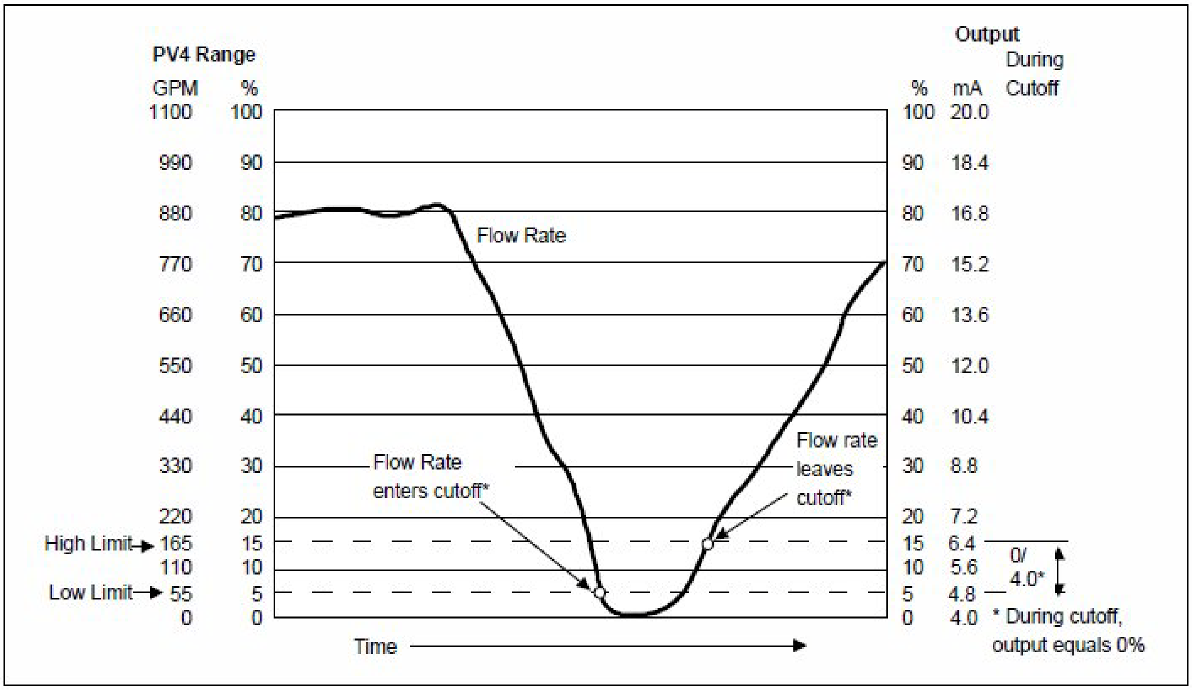


Figure 15 - Low Flow Cutoff

ATTENTION
The low flow cutoff action also applies for reverse flow in the negative direction. For the sample shown in Figure 15, this would result in a low limit of –55 GPM and a high limit of –165 GPM.

5.5.9 Using Custom Engineering Units

Using Custom Units for PV4 Flow Measurement

The SCT contains a selection of preprogrammed engineering units that you can choose to represent your PV4 flow measurement. If you want the PV4 measurement to represent an engineering unit that is not one of the preprogrammed units stored in the SCT, you must select custom units and enter a tag that identifies the desired custom unit.

Using the SCT, selecting Custom Units allows you to choose a unit that is compatible with your application process. Additionally, a conversion factor must be calculated and entered when configuring the PV4 flow variable. This conversion factor is a value used to convert the standard units used by the SMV into the desired custom units. The standard units used by the SMV are:

- Tonnes/hour – for mass flow
- Meters3/hour – for volumetric flow

For example, to calculate the conversion factor for a volumetric flow rate of Standard Cubic Feet per Day – SCFD

$$Flow\ in\ SCFD = \left(Flow\ in\ \frac{m^3}{hr}\right)\left[\left(\frac{ft}{0.3048m}\right)^3 \bullet \left(\frac{24\ hr}{1\ day}\right)\right] = Flow\ in\ \frac{m^3}{hr} \bullet 847.552$$

Conversion Factor = 847.552

For example, to calculate the conversion factor for a mass flow rate of Kilograms per day – kg/day

$$Flow\ in\ kg/d = \left(Flow\ in\ \frac{t}{hr}\right)\left[\left(\frac{kg}{.001}\right) \bullet \left(\frac{24\ hr}{1\ day}\right)\right] = Flow\ in\ \frac{t}{hr} \bullet 24000$$

Conversion Factor = 24000

This factor is then entered as the Conversion Factor value in Flow Compensation Wizard of the SCT during configuration. Please note that when using the standard equation, the conversion factor, as well as other values, are used to calculate the Wizard Kuser factor. When using the dynamic corrections equation, the conversion factor is used as the Kuser factor.

Refer to the SCT on-line manual for additional information about using custom units

5.5.10 Flow Compensation Wizard (DE only)

A Flow Compensation Wizard is provided with the SCT 3000 which is used to configure PV4, the flow variable of the SMV 800 Multivariable Transmitter. The flow compensation wizard will guide you in configuring the PV4 output for either a standard flow equation or a dynamic compensation flow equation.

Standard Compensation Equation

The SMV 800 standard flow equation is a simplified version of the ASME MFC-3M flow equation. The SMV 800 uses the standard equation to compensate for the density changes in gases, liquids and steam (saturated and superheated) and can be used with any primary flow element that behaves according to the following equation:

Ideal Volume Flow

volume flow = K User ∗ sqrt[(Pdes / Pf) ∗ (Tf / Tdes) ∗ DP]

units: Pf, Pdes, DP: Pa Tf, Tdes(K)

Ideal Mass Flow

mass flow = K User ∗ sqrt[(Pf / Pdes) ∗ (Tdes/ Tf) ∗ DP]

units: Pf, Pdes, DP: Pa Tf, Tdes(K)

Steam Mass Flow

Where:

DeltaP is the flow meter signal at the design density,
p_{des} is the design density, in Lb/Cu.Ft., which corresponds to design P & T of the flow element, and p_{act} is the actual steam density calculated in this routine.

Dynamic Compensation Equation

The SMV 800 dynamic compensation flow equation is the ASME flow equation as described in ASME MFC-3M, "Measurement of Fluid Flow in Pipes Using Orifice, Nozzle and Venturi." The dynamic compensation flow equation should be used to increase the flow measurement accuracy and flow turndown for the primary elements listed in Table 14 - Primary Flow Elements.

Table 14 - Primary Flow Elements

Primary Element		Application
Orifice	- Flange taps (ASME - ISO) D t 2.3	Gases, liquids and steam
	- Flange taps (ASME - ISO) 2 d D d 2.3	Gases, liquids and steam
	- Corner taps (ASME - ISO)	Gases, liquids and steam
	- D and D/2 taps (ASME - ISO)	Gases, liquids and steam
	- 2.5D and 8D taps (ASME - ISO)	Liquids
Venturi	- Machined Inlet (ASME - ISO)	Liquids

- Rough Cast Inlet (ASME - ISO)	Liquids
- Rough Welded sheet-iron inlet (ASME - ISO)	Liquids
Ellipse® Averaging Pitot Tube	Gases, liquids and steam
Nozzle (ASME Long Radius)	Liquids
Venturi Nozzle (ISA inlet)	Liquids
ISA Nozzle	Liquids
Leopold Venturi	Liquids
Gerand Venturi	Liquids
Universal Venturi Tube	Liquids
Lo-Loss Tube	Liquids

Dynamic Compensation Equation

The dynamic compensation flow equation for mass applications is:

$$Flow = N_{M\rho} \bullet C \bullet Y_1 \bullet E_V \bullet d^2 \bullet \sqrt{\rho_f \bullet h_W}$$

which provides compensation dynamically for discharge coefficient, gas expansion factor, thermal expansion factor, density, and viscosity.

For details on configuring Flow algorithm refer to the SCT 3000 online User manual, #34-ST-10-08

Standard Equation

The SMV 800 standard flow equation is a simplified version of the ASME MFC-3M flow equation. The SMV 800 uses the standard equation to compensate for the density changes in gases, liquids and steam(saturated and superheated) and can be used with any primary flow element that behaves according to the following equation:

$$Flow = K_{usr} \bullet \sqrt{\Delta P}$$

5.5.11 Saving, Downloading and Printing a Configuration File

Once you have entered the SMV parameter values into the SCT tab cards, you save the database configuration file. If you are configuring the SMV on-line, you can save and then download the configuration values to the transmitter.

Be sure to save a backup copy of the database configuration file on a disk.

You can also print out a summary of the transmitter's configuration file. The printable document contains a list of the individual parameters and the associated values for each transmitter's database configuration.

Follow the specific instructions in the SCT 3000 help to perform these tasks.

5.5.12 Verifying Flow Configuration

To verify the SMV transmitter's PV4 calculated flow output for your application, you can use the SMV to simulate PV input values to the transmitter and read the calculated flow value (PV4). The flow value can be compared with expected results and then adjustments can be made to the configuration if necessary.

6 HART Transmitter Configuration

6.1 Overview

Each new SMV 800 Transmitter configured for HART protocol is shipped from the factory with a basic configuration database installed. This basic configuration database must be edited or revised to meet the requirements of your process system. The process in this section assumes that you will use the **Field Device Communicator (FDC)** application for HART configuration tasks. The **FDC** application provides the facilities for the online and offline configuration of Transmitters operating with HART protocol

Online configuration requires that the Transmitter and MCT404 Toolkit are connected and communication between the two has been established. Online configuration provides a set of functions with which to perform various operations on a HART communication network through an active communication link. These operations primarily include configuration, calibration, monitoring, and diagnostics. Typically, these operations could be realized through various constructs exposed by the Device Description (DD) file. In addition, the **FDC** application provides some functions for convenient execution of these functions.

Offline Configuration refers to configuring a device when the device is not physically present or communicating with the application. This process enables you to create and save a configuration for a device, even when the device is not there physically. Later when the device becomes available with live communication, the same configuration can be downloaded to the device. This feature enables you to save on device commissioning time and even helps you to replicate the configuration in multiplicity of devices with lesser efforts. Currently, FDC does not support creating offline configuration. However, it supports importing of offline configuration from FDM R310 or later versions. The configurations thus imported can be downloaded to the device from FDC.
The following are the tasks that you need to perform for importing offline configuration in FDC application software and then downloading it to the device.

- Create offline configuration template in FDM
- Save the configuration in FDM in FDM format.
- Import the offline configuration in FDC
- Download the offline configuration to the device

Note: For details on creating and using offline configuration, refer to section Offline configuration in FDM User's Guide.

6.1.1 Personnel Requirements

The information and procedures in this section are based on the assumption that the person accomplishing configuration tasks is fully qualified and knowledgeable on the use of the MCT404 Toolkit and is intimately familiar with the SMV 800 family of Transmitters. Therefore, detailed procedures are supplied only in so far as necessary to ensure satisfactory configuration. The other HART configuration Tools are Honeywell Experion in conjunction with FDM, DTMs running on FDM or Pactware, and Emerson 375/475. The organization of Device Configuration and Parameter Descriptions is given in Table 17.

6.2 Overview of FDC Homepage

The FDC homepage consists of links for Online Configuration, Offline Configuration, Manage DDs, and Settings. See below.

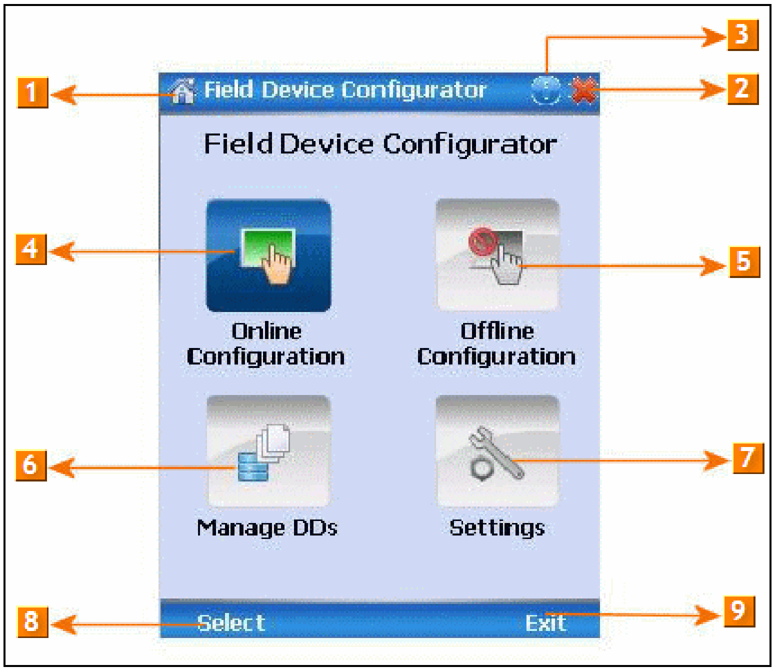


Figure 16 – FDC Homepage

Table 15 lists the items that appear on the FDC homepage and its descriptions.

Table 15 - FDC homepage elements

Items	Description
1	Screen title.
2	Tap to quit FDC.
3	Tap to view the application information.
4	Tap to navigate to Online Configuration screen.
5	Tap to navigate to Offline configuration screen.
6	Tap to navigate to Manage DDs screen.
7	Tap to navigate to Settings screen.
8	Tap to select the highlighted menu option.
9	Tap to quit FDC.

Note: To select a particular option in FDC you can either select the option and then tap **Select** or you can directly double-tap the option.

6.2.2 Settings

Use this feature to customize FDC. You can customize FDC for device detection, DD selection, and other application settings.

6.2.2.1 Device Identification

Use the following options to configure FDC to identify a device.

1. **Using Poll Address**
   - **Use poll address 0 only:** Use this to detect a device with the poll address as zero.
   - **Find first poll address and use**: Use this to detect a device with the first available poll address in the range of poll addresses that are available.
   - **Use selected poll address**: Use this to detect a device with a specific poll address in the range of zero to 63.
   - **Use From**: Use this to detect a device based on a range of poll addresses.

- **Using Device TAG**: Use this to detect a device with a known HART tag.
- **Using Device LONG TAG**: Use this to detect a device with a known HART long tag (applicable for devices with HART 6 or later Universal revisions).

Note: If you choose the option Using Device TAG or Using Device LONG TAG, FDC prompts you to enter a device tag/long tag name during device detection.

6.2.2.2 DD selection

Use the following options to configure FDC to select DD files when a DD with matching device revision is not available.

- **Use DD file of previous device revision**: Use this option to automatically communicate using a DD file having device revision lower than that of the device.
- **Use generic DD file**: Use this option to automatically communicate to the device using an appropriate generic DD file.
- **Always ask user**: Use this option to always prompt you with a choice for communicating to the device either using the previous device revision or using a generic DD file.
- **Always Use Generic**: Use this option to always communicate to the device using generic DD files even if a DD file with matching device revision as the device is present.

Note: A generic DD file is a DD file that provides access and interface to the universal data and features of a HART device.

6.2.2.3 Other settings

Low storage notification: Use this option to set a percentage value and to notify you with a warning message when the available storage card space is less than the percentage set.
Application diagnostics: Use this option to enable or disable the logging infrastructure for application diagnostics. With this option enabled, FDC creates necessary log files for troubleshooting and diagnostics. These files are stored in SD Card\FDC folder.
Note: You must not enable this option unless suggested by Honeywell TAC because this may impact the application performance.

6.2.3 Manage DDs

Using this feature, you can manage the DD files installed with FDC. A DD file contains descriptive information about the functionality of a device. By default, a set of DD files are installed with FDC. However, if you do not have a DD for a given device, you can install it using the “Add DD” feature. Similarly, you can uninstall a DD file or a set of DD files using “Delete DD” feature. You can also directly copy the DD files in appropriate hierarchy using a card reader or “Active Sync/Mobile Device Center” mechanisms. In such a case, you should validate the library view using the “Refresh” feature.

6.2.3.1 Overview

Using Manage DDs, you can view, add, or delete DD files for devices. A list of already available DD files is maintained in the DD Library. FDC lists the installed DD files in a hierarchy as below:

Manufacturer

Device Type

DevRev xx, DDRev yy

DevRev pp, DDRev qq

6.2.3.2 Add a DD file

To add a DD file for a device, perform the following steps.

1. From the FDC homepage, tap Manage DDs > Select.

   The **Manage DDs** dialog box appears.

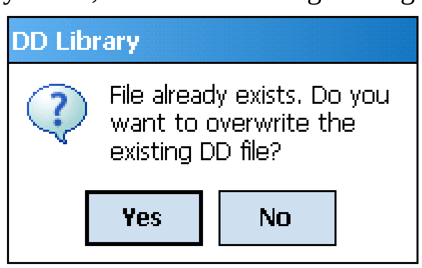
2. Tap **Options** > **Add DD**.

Or

Tap .

The **ADD DD files** dialog box appears.

3. Browse to the location in which the DD file (**.fm8)** is located and tap **OK**.
4. If the DD file already exists, then the following message appears.



5. Tap **Yes** to overwrite the existing DD files.
6. If the DD file is added successfully, a success message appears.

6.2.3.3 Delete a DD file

Using this option, you can delete a particular version of a DD file. To delete a DD file for a device, perform the following steps.

1. From the FDC homepage, tap **Manage DDs** > **Select**.

The **Manage DDs** dialog box appears.

2. You can choose to delete DD(s) in one of the following ways:
   a) By device manufacturer – Select a device manufacturer to delete all device types and DDs associated with the manufacturer's devices.
   b) By device type – Select a device type to delete all DDs associated with the device.
   c) By device revision and DD revision – Select the specific entry of device revision, DD revision to delete the specific DD
3. Tap **Options** > **Delete DD.**

Or

Tap .

A confirmation message appears.

4. Tap **Yes**.

If the DD file is deleted successfully, a success message appears.

5. Tap **OK** to return to **DD Library** page.

6.2.3.4 Validating a manually edited library

Besides using the Add/Delete DD features, advanced users may also manipulate a DD library by directly editing the contents of the FDC\Library folder. DD files can also be transferred directly to this location by accessing the SD Card on MCT404/MCT202 through a card reader and/ or by connecting MCT404/MCT202 to a PC. In such cases, you must perform the following steps to validate a DD Library, thus edited manually:

1. From the **FDC homepage**, tap **Manage DDs** > **Select**

The **Manage DDs** dialog box appears

2. Tap **Options**.
3. Tap **Refresh Library**.

   Or

   Tap .

   A confirmation message appears.
4. Tap **Yes**. The DD library is now validated and refreshed.

6.2.4 Online configuration

Using online configuration, you can configure, calibrate, monitor and diagnose a HART device which is connected to MCT404 Toolkit. FDC provides the features to perform these functions through the various constructs offered through the DD file of the device. Besides there are certain other features available under this link for you to conveniently work with a HART device with live communication. After making changes to the device you can also save a snapshot of the device data as history to later transfer it to FDM for record and audit purposes.

6.2.5 Offline configuration

Offline configuration refers to configuring a device offline (without physically connecting to the device) using a template and then downloading the configuration to the device. Presently, FDC application software does not support creating offline configuration. However, it supports importing of offline configuration from FDM (R310 and above).

6.2.6 Online Configuration Overview

Online Configuration option provides you a set of functions with which you can perform various operations on a device with an active communication link. These operations primarily include configuration, calibration, monitoring, and diagnostics of a HART device. Typically, these operations could be realized through various constructs exposed by the DD file of the device. In addition, FDC also provides some additional application functions for you to perform these functions more conveniently.

Online configuration includes a set of functions to perform various operations on a Transmitter with active communication link. These operations primarily include:

- Identifying a Transmitter
- Reading and reviewing Transmitter variable values
- Editing Transmitter variable values
- Downloading the selected/edited variable set to the Transmitter

6.2.6.1 Detecting and loading a device

Tap the **Online Configuration button on the Application Home page.**

The device detection and loading process automatically gets started. Depending upon the Device Detection and DD Selection settings you may have chosen, you may be prompted for certain inputs as described in the **Settings** section.

6.2.7 Overview of Device Homepage

Once the device is detected and loaded successfully, you can view the device homepage for the identified device.

The workspace area on the device homepage consists of 4 tabs on the left hand side. Selecting a tab displays functions/information associated with that tab on the right hand side.

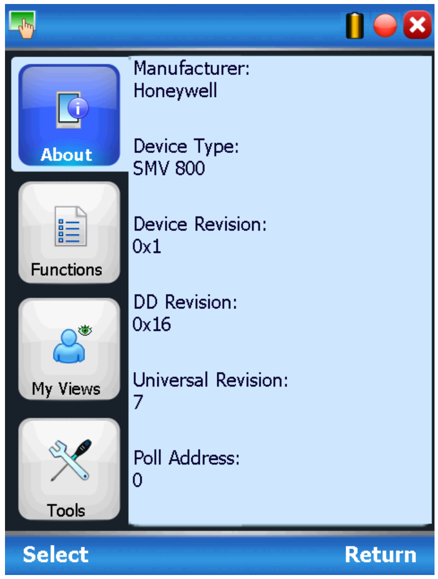


Figure 17 – Device Homepage

Table 16 lists the device health status and their indications.

Table 16 - Device health status

Device health icons	Indications
	Indicates there's no health or status indicators reported by the device
	Indicates that the device is potentially reporting a status which needs attention and further investigation. It is advised that you use Device Status under Functions tab to further investigate the details.
	Indicates that the device has lost communication with MC Toolkit

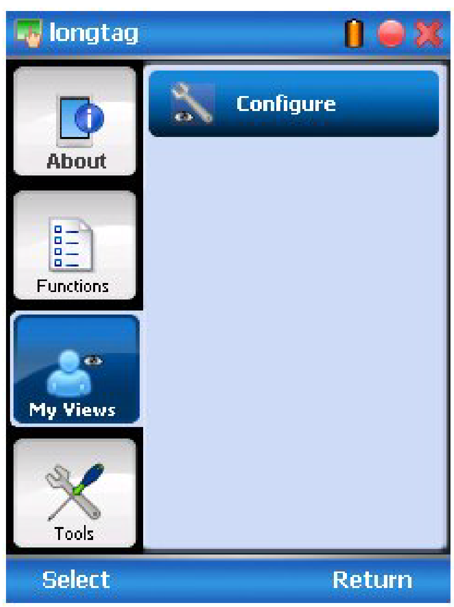
Tabs on the Device Home page

The following are the options that are available on the device homepage

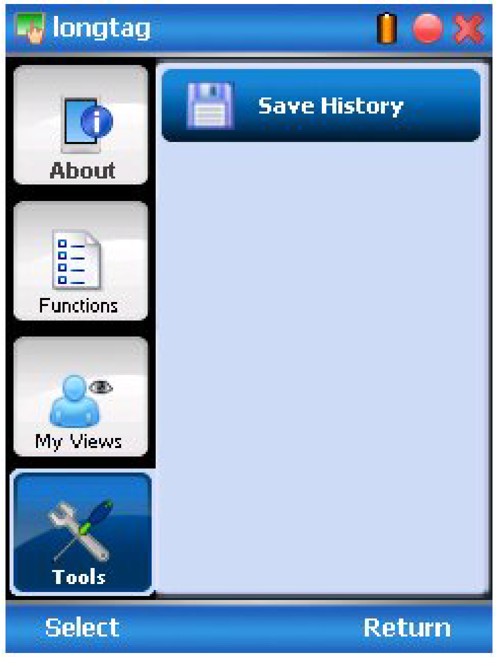
- **About tab**: Use this option to view the device identity related information. You can view the manufacturer name, device type, device revision, DD revision, and universal revision of the HART device.

- **Functions tab**: This tab provides various options which you may use for navigating through the device specific user interface and some standard features offered by FDC across all devices. For the sake of explanations, the right side options under this tab shall be referred as “Entry points” throughout the rest of the document.

- **My Views tab:** Quite often, you may be interested only in a set of variables of a device. But navigating through the menu tree of a device may not be helpful because of time and further all variables that you want may not be in the same location. Using this unique feature of FDC, you can now choose what you want to view in a device in your own views. FDC allows you to create two such views per device revision of a specific device type. You can always modify them as per your needs.



- **Tools tab:** This tab is a placeholder for FDC specific tools for providing certain functionality. Currently the only option it provides is called as Save History. Using this option you can save the snapshot of the device variables. This snapshot is saved in a format which can be later imported as a history record in FDM.



6.2.8 Using FDC for various device operations

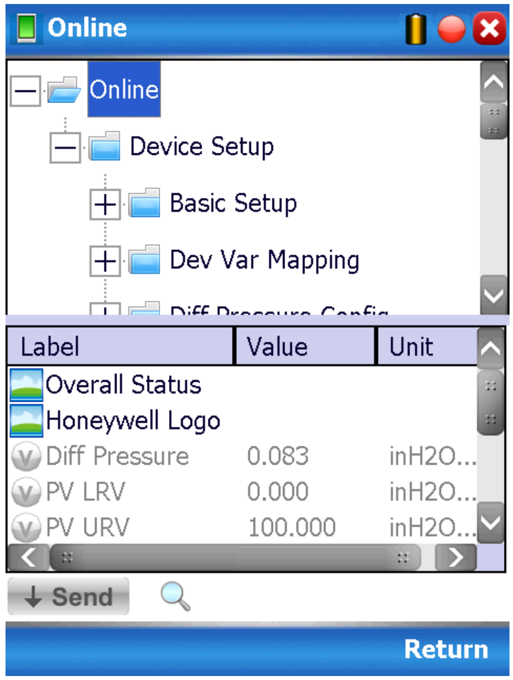
Typical operations with a smart field device involve configuration, calibration, monitoring, and diagnostics. FDC enables you to achieve these operations with a HART device via the various interfaces/constructs exposed through the DD file of the device.

The "Functions" tab under the device home page provides the entry points for navigating through the device specific user interface to perform the above mentioned operations. A device may define up to four entry points in the DD file. All devices shall have at least one entry point, generally referred to as "Online". Besides the device specific entry points, FDC provides custom entry points for navigational aids to specific types of information/features. One such entry point is called Device Status, which is used for reviewing device health. Another is called Methods List, which is used to navigate to all the methods available in a device.

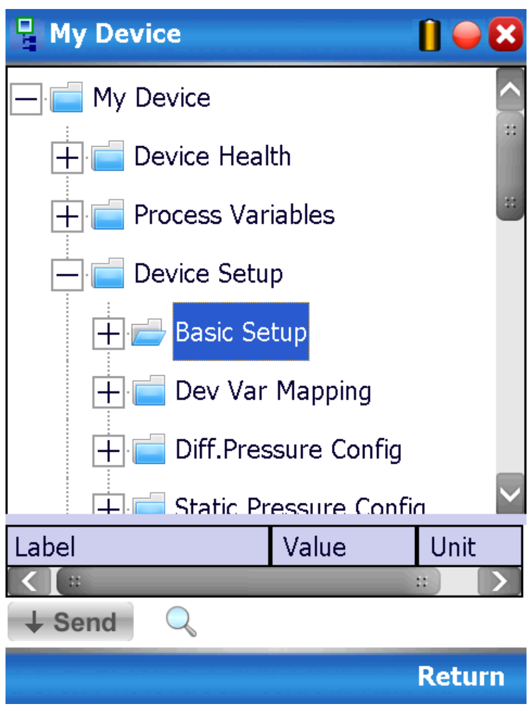
All of the device specific entry points represent the device interface, as explained using the Online entry point as an example. All the other device specific entry points have a similar interface except for the fact that the variables and other DD constructs provided under each may vary as indicated by the title of each entry point.

For the sake of explanation, the pages that appear on navigating through the device specific entry points are referred to as "Device Configuration" pages in this document. However it must be noted that this does not prohibit you from performing other device operations as explained above.

Online Device Entry Point: When you tap on to open the Online tab, the device configuration screen appears as shown below.



Alternately you can access the full EDDL features by selecting the “My Device” Tab



Navigate through the Menus to access various functions. See Table 17 to view lists of all the parameters in the SMV 800.

6.2.9 Device Configuration and Parameter Descriptions

Table 17 lists descriptions of all parameters for a HART Transmitter with the Online tab menu path. The same parameters may be accessed via the Shortcuts menu under the My Device tab.

Table 17 - HART Transmitter Parameters

SMV 800 Main Menu	Basic Setup	Table 18
	Standard Flow Setup (DD Host only)	Table 19 Applicable to DD hosts only
	Advanced Flow setup (DTM only)	Refer to section Using DTMs Applicable to DTM Host only.
	Device Variable Mapping	Table 20
	Differential Pressure Configuration	Table 21
	Static Pressure Configuration	Table 22
	Process Temperature Configuration	Table 23
	Flow Configuration	Table 24
	Meter body Temperature Configuration	Table 25
	Process Variables	Table 26
	Calibration	Table 27
	Device Status	Table 28
	Diagnostics	Table 29
	Services	Table 30
	Detailed Setup	Table 31
	Meter body Details	Table 32
	Display Setup	Table 33
	Upgrade options	Table 34
	Review	Table 35

Table 18 – Basic Setup

Basic Setup parameters		
Key: Plain = Read only **Bold** = Configurable **<u>Bold underline</u>** = Method ***Bold italic*** = Table or graph		
Manufacturer		Self explanatory
Model		Displays Model or Device Type of SMV 800 Transmitter
Dev ID		Displays the HART unique ID of the SMV 800 Transmitter
Universal Rev		HART Protocol Universal Revision (HART 7)
Software Rev		Self explanatory
Fld dev rev		Displays Field Device Revision of the SMV 800 Transmitter
Maint Mode		Displays the Maintenance mode set by Experion PKS. When a HART device requires maintenance, the engineer or the operator changes the PV Source value of the corresponding AI channel to MAN. As soon as the PV Source value is changed for the channels connected to the ST 800 transmitters, Experion communicates the channel mode status to the corresponding ST 800 transmitters. Upon receiving this status, if the value is MAN, the transmitter displays an M and Available for Maintenance on the local display of the transmitter. The status display on the transmitter ensures that the field technician can locate and perform the maintenance work on the correct transmitter without impacting the integrated devices in the process loop. The transmitter continues to display the Available for Maintenance status on its local display until the PV Source status of the corresponding AI channel is changed to AUTO / SUB or the transmitter is power cycled. For more information, refer to the Experion Knowledge Builder
Write Protect		Self explanatory
Config Chng Count		Configuration Change Counter – this counter keeps track of the number of times any configuration parameter has been changed

Tag		Enter Tag ID name up to 8 characters
Long Tag		Enter Tag ID name up to 32 characters
Date		Gregorian calendar date that is stored in the Field Device. This date can be used by the user in any way.
Descriptor		Enter any desired or useful descriptor of the transmitter.
Loop Current Mode		Enable: enables loop current mode (analog output will operate as a 4 to 20 mA signal consistent with the transmitter output). Disable: disables loop current mode (analog output will be fixed to value set by user)
Tx Install Date		
TM Install Date		
Final asmbly num		Used for identifying electronic components. This date can be used by the user in any way.
Message		Enter a message up to 32 alphanumeric characters) that will be sent to the Display. The message will be shown on the Display interspersed with the configured screens.
<u>Clear Message</u>		Select to clear message from transmitter's local display.
<u>Model Number</u>		Displays Model number of the ST 800 Pressure Transmitter

Table 19 – Standard Flow Setup

Standard Flow Setup Parameters		
Key: Plain = Read only **Bold** = Configurable **<u>Bold underline</u>** = Method ***Bold italic*** = Table or graph		
<u>Flow default Settings</u>		Allows configuring flow using default values
<u>Flow Setup Options</u>	• Algorithm Type • Equation Model • Fluid Type • Flow Output Type • Flow Calculation Standard • Primary Element Sub Type (Orifice, Venturi, Nozzle) • Primary Element Type (relevant list for the selected sub type) • VCone Y Method (VCone only) • VCone Simplified Liquid Switch (VCone only) • Reverse Flow Calculation • Reynolds Exponent • Fluid Selection (used by DTM tool for auto calculation of Viscosity, Density Coefficients) • Polynomial Order (used by DTM tool for auto calculation of Viscosity, Density Coefficients) • Bore Material Type • Bore Diameter • Bore Diameter Measuring Temperature • Bore Thermal Expansion Coefficient • Pipe Material • Pipe Diameter • Pipe Diameter Mearusing Temperature • Pipe Thermal Expansion Coefficient • Density Manual Input On/Off • Viscosity Manual Input On/Off • Cd Manual Input On/Off • Y Manual Input On/Off • Fa Manual Input On/Off • Static Pressure Failsafe On/Off • Temp Failsafe On/Off • DP Simulation On/Off • SP Simulation On/Off • PT Simulation On/Off • Flow Simulation On/Off	Allows Full Flow Configuration. Note that based on the selection at each step in the Method, relevant settings are shown in subsequent steps.

Standard Flow Setup – Flow Parameters		
Key: Plain = Read only **Bold** = Configurable **<u>Bold underline</u>** = Method ***Bold italic*** = Table or graph		
Flow Parameters		
Pipe Diameter_D		Pipe Diameter in inches
Bore Dia_d/APT Probe Width_d		Bore Diameter in inches. In case of Average Pitot Tube, this parameter is Pitot Tube Probe Width
Isentr coeff_k		Isentorpic Exponent
Reynolds Coefficient1		Reynolds Coefficient R1 Applicable when Algorithm Options = SMV3000 and Equation Model = Dynamic
Reynolds Coefficient2		Reynolds Coefficient R2 Applicable when Algorithm Options = SMV3000 and Equation Model = Dynamic
Low limit for Reynolds Number		High Limit for Reynolds number Applicable when Algorithm Options = SMV3000 and Equation Model = Dynamic
High limit for Reynolds Number		High Limit for Reynolds number Applicable when Algorithm Options = SMV3000 and Equation Model = Dynamic
Bore Diam Meas Temp		Bore Diameter measuring Temperature in degF
Bore Ther Exp Coeff		Bore Thermal Expansion Coefficient
Pipe Dia Meas Temp		Pipe Diameter measuring Temperature in degF
Pipe Ther Exp Coeff		Pipe Thermal Expansion Coefficient
Loc Atmos Pressure		Local Atmospheric Pressure in psi
<u>Write Pipe Values</u>	• Pipe Diameter • Pipe Diameter Measure Temperature • Pipe Material • Pipe Thermal Expansion Coefficient	Configure Pipe parameters Applicable when Equation model is Dynamic.

Write Bore Values	• Bore Diameter • Bore Diameter Measure Temperature • Bore Material • Bore Thermal Expansion Coefficient	Configure Bore parameters Applicable when Equation model is Dynamic.
Write Reynolds Coeff Values	• Reynolds Coefficient r1 • Reynolds Coefficient r2	
Write Reynolds Limits	• Low Limit Reynolds Number • High Limit Reynolds Number	
Write Isentropic, Atmosphere Values	• Isentropic Exponent • Local Atmospheric Pressure	
KUser		Units Conversion Factor Applicable when Algorithm Option is SMV3000 and Equation model is Standard. When Equation Model is Dynamicc, the value will be set to 1.0
Write KUser		Configure Units Conversion Factor Applicable when Algorithm Option is SMV3000 and Equation model is Standard

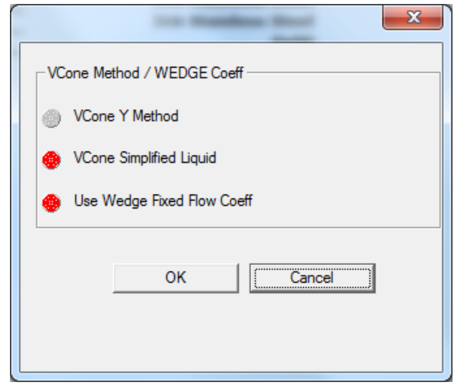
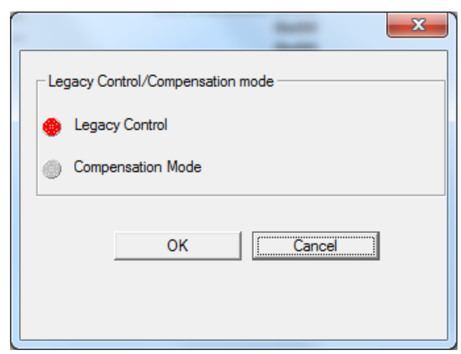
Standard Flow Setup – Process Data		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
Process Data		
Nominal (Default) Values		
Nominal Temp		Nominal or Default Temperature
Nominal Abs Pres		Nominal or Default Absolute Pressure
Write Nominal Values	• Nominal temperature • Nominal absolute pressure	Configure Nominal Values
Design Values		
Design Temperature		Design Temperature
Design Pressure		Design Pressure
Design Density		
Write Design Values	• Design Temperature • Design Pressure	Configure Design Values
Write Design Density	• Design Density	Configure Design Values
Normal (Max) Values		

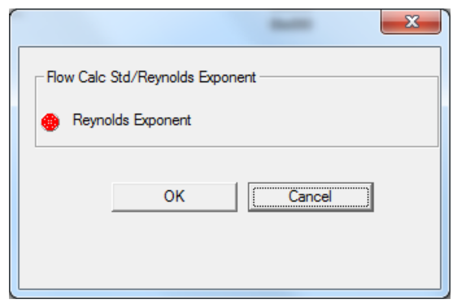
Flow Output Type	• No Flow Output • Ideal Gas Actual Volume Flow • Ideal Gas Mass Flow • Steam Mass Flow • Liquid Mass Flow • Ideal Gas Volume Flow @ Std Condition • Liquid Actual Volume Flow • Liquid Volume Flow @ Std Condition	
Units Mode	Default KUser	This is an internal parameter.
K_user/FlowCoeff/Fc		This parameter represents values based on Algorithm Option and Flow Calculation Standard. SMV3000 Algorithm : This parameter represents KUser values / Unit Conversion factor. Equation model = Standard, this is user editable. When Equation model = Dynamic, this value is defaulted to 1. SMV800 Algorithm: For WEDGE and Averaging Pitot Tube, this parameter represents Flow Coefficient. For Conditional Orifice, this parameter represents Calibration Factor Fc.
Max Flow Rate		This is an internal parameter in the DD hosts. This parameter is configurable in the DTM tool and is used for Kuser calculation when Algorithm is: SMV3000 Equation Model is: Standard
Max Differential Pressure		This is an internal parameter in the DD hosts. This parameter is configurable in the DTM tool and is used for Kuser calculation when Algorithm is: SMV3000 Equation Model is: Standard

Fluid Parameters Config		
Fluid List		This is an internal parameter in the DD hosts. User has to manually enter the Viscosity and Density Coefficients regardless of the selected fluid. When using DTM Tool, Viscosity and Density Coefficients will be automatically calculated for the selected fluid.
Polynomial order		This is an internal parameter in the DD hosts. When using the DTM Tool, Viscosity and Density Coefficients will be automatically calculated using the Polynomial of this order.
Custom Fluid		
Configure Fluid	Fluid Polynomial order	Fluid: Allows selection of a fluid from list of 108 fluids and a Custom Fluid. The Fluid List is also configurable in the DTM tool. Polynomial Order: Allows selection of 0 to 4th order Polynomial. The Polynomial Order is also configurable in the DTM tool
Viscos Polynom Coeff		
coefficient_V1		Viscosity Coefficient x used in calculating the Viscosity. Applicable when Equation Model is Dynamic.
coefficient_V2		Same as above
coefficient_V3		Same as above
coefficient_V4		Same as above
coefficient_V5		Same as above
Lo Temp Limit Viscosity TuMin		Lower Temperature point for calculating the Viscosity
Hi Temp Limit Viscosity_TuMax		Upper Temperature point for calculating the Viscosity
Write Viscosity 1,2,3		Write Viscosity Polynomial Coefficients 1,2, and 3
Write Viscosity 4,5		Write Viscosity Polynomial Coefficients 4 and 5

<u>**Write Viscosity Polynom Limits**</u>	• Lo Temp Limit Viscosity TuMin • Hi Temp Limit Viscosity_TuMax	Temperature low limit and High Limits for Viscosity coefficients calculation
Density Polynom Coeff		
coefficient_d1		Density Coefficient x used in calculating the Density. Applicable when Equation Model is Dynamic, Fluid Type is Liquid
coefficient_d2		Same as above
coefficient_d3		Same as above
coefficient_d4		Same as above
coefficient_d5		Same as above
Lo Temp Limit Density_TpMin		Lower Temperature point for calculating the Density
Hi Temp Limit Density_TpMax		Upper Temperature point for calculating the Density
<u>**Write Density 1,2,3**</u>		Write Desnity Polynomial Coefficients 1,2, and 3
Write Density 4,5		Write Density Polynomial Coefficients 4 and
<u>**Write Density Polynom Limits**</u>	• Lo Temp Limit Density_TpMin • Hi Temp Limit Density_TpMax	Temperature low limit and High Limits for Density coefficients calculation

Standard Flow Setup – Flow Configurations		
Key: Plain = Read only **Bold** = Configurable <u>**Bold underline**</u> = Method ***Bold italic*** = Table or graph		
Flow Configurations		
VCone Method / WEDGE Flow Coeff		When Algorithm / Primary Element is VCone, this parameter value shows whether VCone Y Method or Simplified Liquid is used. When Algorithm / Primary Element is WEDGE, this parameter shows if the user entered Fixed Flow Coefficient is used, or default Coefficient is used

VCone Method / WEDGE Flow Coeff *(continued)*		Double click on the parameter to see the current setting 
Fluid Type		
<u>Config Fluid and VCone Type</u>		
Legacy Control / Compensation Mode		Shows if the Algorithm is SMV800 type or SMV3000 type. When Legacy Cotnrol is ON, Algorithm is SMV 3000 type. When OFF, it is SMV800 type. Compensation mode Dynamic or Standard. When Compensation mode is ON, Equation Model is Standard. When OFF, it is Dynamic Double click on the parameter to see the current setting 
Flow Output Type	○ No Flow Output ○ Ideal Gas Actual Volume Flow ○ Ideal Gas Mass Flow ○ Steam Mass Flow ○ Liquid Mass Flow ○ Ideal Gas Volume Flow @ Std Condition ○ Liquid Actual Volume Flow ○ Liquid Volume Flow @ Std Condition	

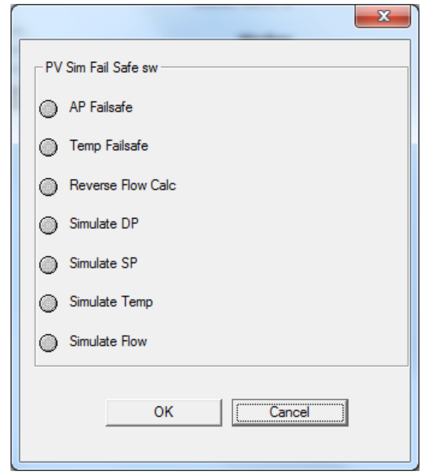
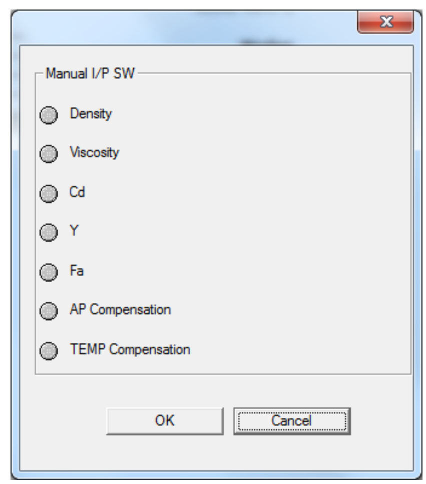
Config Flow Output Type	○ Flow Output Type ○ Algorithm Type ○ Equation Model	Configures: Flow Output Type (see the Flow Output Type parameter for available selections) Algorithm Type: SMV800 or SMV3000. SMV800 - Allows Flow calculation using newer Standards using predefined list of Primary Elements. SMV3000 - Allows selecting legacy SMV3000 algorithms and Primary Elements. Equation Model: Dynamic or Standard Dynamic option allowed on SMV800 Algorithm or SMV3000 Algorithm. Select SMV3000 Algorithm Option sf you need to calculate Standard Flow
Flow Calc Std / Reynolds Exponent		Shows the Flow Calculation Standard and Discharge Exponent setting. When the Reynolds Exponent is ON, the value is 0.75. When ON, the value is 0.5. 
Flow Calc Type	● ASME-MFC-3M ● ISO5167 ● GOST ● AGA3 ● VCONE/WAFER CONE ● ASME-MFC-14M ● WEDGE ● AVERAGE PITOT TUBE ● INTEGRAL ORIFICE ● CONDITIONAL ORIFICE ● CONDITIONAL ORIFICE ● ASME 1989	When Algorithm Option = SMV800, all the Flow Calc Types except for ASME 1989 applicable. When Algorithm Option = SMV3000, ASME 1989 applicable.
Config Flow Calc Std	● Flow Calculation Std type ● Reynolds Exponent	Configures Flow Calculation Standard and Reynolds Exponent or Discharge Exponent

<u>Primary Element Type</u>	Algorithm Option = SMV800: • ASME-MFC-3 O-FTaps • ASME-MFC-3 O-CTaps • ASME-MFC-3 O-D&D/2Taps • IS05167 O-FTaps • IS05167 O-CTaps • IS05167 O-D&D/2Taps • Gost 8.586 O-FTaps • Gost 8.586 O-CTaps • Gost 8.586 O-3-RadiusTaps, • AGA3 O-FTaps • AGA3 O-CTaps • ASME-MFC-3 ASME LR Nozzles • ASME-MFC-3 V-Nozzles • ASME-MFC-3 ISA1932 Nozzles • IS05167 LRNozzles • IS05167 V-Nozzles • IS05167 ISA1932 Nozzles • Gost 8.586 LRNozzles • Gost 8.586 V-Nozzles • Gost 8.586 ISA 1932 Nozzles • ASME-MFC-3 V-As-Cast CSec • ASME-MFC-3 V-Machined CSec • ASME-MFC-3 V-RW CSec • IS05167 V-As-Cast CSec • IS05167 V-M CSec • IS05167 V-RW Sheet-Iron CSec • Gost 8.586 V-CU Cone Part • Gost 8.586 V-MUCone Part • Gost 8.586 V-WU ConePart made of Sheet Steel • APT • Std Vcone • Wafer Cone • Wedge • Integral Orifice • Small Bore O-FTaps • Small Bore O-CTaps • Cond O-405 • Cond O-1595 FTaps • Cond O-1595 CTaps • Cond O-1595 D&D/2Taps Algorithm Option = SMV3000: • Orifice Flange Taps D >/= 2.3 inches • Orifice Flange Taps 2 </= D </= 2.3 • Orifice Corner Taps • Orifice D and D/2 Taps • Orifice 2.5 and 8D Taps • Venturi Machined Inlet • Venturi Rough Cast Inlet • Venturi Rough Welded Sheet-Iron Inlet • Leopold Venturi • Gerand Venturi • Universal Venturi Tube • Low-Loss Venturi Tube • Nozzle Long radius • Nozzle Venturi	

<u>Primary Element Type</u> *(continued)*	• Preso Ellipse 0.875 inch for 2 inch Pipe • Preso Ellipse 0.875 inch for 2.5 inch Pipe • Preso Ellipse 0.875 inch for 3 inch Pipe • Preso Ellipse 0.875 inch for 4 inch Pipe • Preso Ellipse 0.875 inch for 5 inch Pipe • Preso Ellipse 0.875 inch for 6 inch Pipe • Preso Ellipse 0.875 inch for 8 inch Pipe • Preso Ellipse 0.875 inch for 10 inch Pipe • Preso Ellipse 0.875 inch for 12 inch Pipe • Preso Ellipse 0.875 inch for 14 inch Pipe • Preso Ellipse 1.25 inch for 12 inch Pipe • Preso Ellipse 1.25 inch for 14 inch Pipe • Preso Ellipse 1.25 inch for 16 inch Pipe • Preso Ellipse 1.25 inch for 18 inch Pipe • Preso Ellipse 1.25 inch for 20 inch Pipe • Preso Ellipse 1.25 inch for 22 inch Pipe • Preso Ellipse 1.25 inch for 24 inch Pipe • Preso Ellipse 1.25 inch for 26 inch Pipe • Preso Ellipse 1.25 inch for 28 inch Pipe • Preso Ellipse 1.25 inch for 30 inch Pipe • Preso Ellipse 1.25 inch for 32 inch Pipe • Preso Ellipse 1.25 inch for 34 inch Pipe • Preso Ellipse 1.25 inch for 36 inch Pipe • Preso Ellipse 1.25 inch for 42 inch Pipe • Preso Ellipse 1.25 inch for gt 42 inch Pipe • Preso Ellipse 2.25 inch for 16 inch Pipe • Preso Ellipse 2.25 inch for 18 inch Pipe • Preso Ellipse 2.25 inch for 20 inch Pipe • Preso Ellipse 2.25 inch for 22 inch Pipe • Preso Ellipse 2.25 inch for 24 inch Pipe	

Primary Element Type *(continued)*	• Preso Ellipse 2.25 inch for 26 inch Pipe • Preso Ellipse 2.25 inch for 28 inch Pipe • Preso Ellipse 2.25 inch for 30 inch Pipe • Preso Ellipse 2.25 inch for 32 inch Pipe • Preso Ellipse 2.25 inch for 34 inch Pipe • Preso Ellipse 2.25 inch for 36 inch Pipe • Preso Ellipse 2.25 inch for 42 inch Pipe • Preso Ellipse 2.25 inch for gt 42 inch Pipe • Other Pitot Tube	
Bore Material	When Flow Calc Standard is other than GOST • 304 Stainless Steel • 316 Stainless Steel • 304/316 Stainless Steel • Carbon Steel • Hastelloy • Monel 400 • Other When Flow Calc Standard is GOST • 35П • 45П • 20ХМП • 12Х18Н9ТП • 15К,20К • 22К • 16ГС • 09Г2С • 10 • 15 • 20 • 30,35 • 40,45 • 10Г2 • 38ХА • 40Х • 15ХМ • 30ХМ,30ХМА • 12Х1МФ • 25Х1МФ • 25Х2МФ • 15Х5М • 18Х2Н4МА • 38ХН3МФА • 08Х13 • 12Х13 • 30Х13 • 10Х14Г14Н14Т • 08Х18Н10 • 12Х18Н9Т • 12Х18Н10Т • 12Х18Н12Т • 08Х18Н10Т	

Bore Material *(continued)*	• 08Х22Н6Т • 37Х12Н8Г8МФБ • 31Х19Н9МВБТ • 06ХН28МдТ • 20П • 25П	
Pipe Material	When Flow Calc Standard is other than GOST • 304 Stainless Steel • 316 Stainless Steel • 304/316 Stainless Steel • Carbon Steel • Hastelloy • Monel 400 • Other When Flow Calc Standard is GOST • 35П • 45П • 20ХМП • 12Х18Н9ТП • 15К,20К • 22К • 16ГС • 09Г2С • 10 • 15 • 20 • 30,35 • 40,45 • 10Г2 • 38ХА • 40Х • 15ХМ • 30ХМ,30ХМА • 12Х1МФ • 25Х1МФ • 25Х2МФ • 15Х5М • 18Х2Н4МА • 38ХН3МФА • 08Х13 • 12Х13 • 30Х13 • 10Х14Г14Н14Т • 08Х18Н10 • 12Х18Н9Т • 12Х18Н10Т • 12Х18Н12Т • 08Х18Н10Т • 08Х22Н6Т • 37Х12Н8Г8МФБ • 31Х19Н9МВБТ • 06ХН28МдТ • 20П • 25П	

PV Simulation and Failsafe Switch	• AP Failsafe • Temp Failsafe • Reverse Flow • Simulate DP • Simulate SP • Simulate Temp • Simulate Flow	Configures Temperature and Static Pressure failsafe ON/Off conditions, Reverse Flow ON/OFF condition and Simulation ON / OFF conditions for Device Variables PV, SV, TV, QV 
Manual Input Switch	• Density • Viscosity • Cd • Y • Fa • AP Compensation • TEMP Compensation	Configures Manual Input On/OFF for Densoty, Viscosity, Fa, Y, Cd and Compensation settings for Static Pressure and Temperature. 

Standard Flow Setup – Element Specific Properties		
Key: Plain = Read only **Bold** = Configurable **<u>Bold underline</u>** = Method ***Bold italic*** = Table or graph		
Element Specific Properties		This Menu will display parameters for algorithms: WEDGE, VCone/WaferCone, Conditional Orifice, Gost Standard.
VCone		Selected Algorithm/Primary Element is VCone
MaxFlowRate_SizingVCone_QMax_PipeScheduleFactor_Fs	SizingVCone_QMax	For VCone Algorithm type, this parameter represents QMax in ft3/sec for Volume Flow type and lb/sec for Mass Flow type
DifferentialPressure_SizingVCone_DPMax	Max Differential Pressure_DPMax	For VCone Algorithm type, this parameter represents DPMax in inH2O39F
<u>Write VCone Values</u>	• Max Flow Rate SizingVCone_QMax • Max Differential Pressure Sizing VCone_DPMaz	Configures VCone sizing parameters
WEDGE		Selected Algorithm/Primary Element is WEDGE
Pipe Diameter_D		Pipe Diameter in inches
Pipe Roughness_RaGost_BetaFactor_WEDGE	Beta Factor_WEDGE	For WEDGE Algorithm type, this parameter represents Beta Factor
InitRadius_rGost_SegmentHeight_Wedge	Segment Height_H	For WEDGE Algorithm type, this parameter represents Segment Height
<u>Write WEDGE Values</u>	• Pipe Diameter • Beta Factor • Segment Height	Configures WEDGE Pipe Diameter, Beta factor and Segment Height
Conditional Orifice		
MaxFlowRate_SizingVCone_QMax_PipeScheduleFactor_Fs	Pipe Schedule Factor Fs	For Conditional Orifice Algorithm type, this parameter represents Pipe Schedule Factor Fs
Write Cond Orifice405 Values		Configures Conditional Orifice Pipe Scheduling Factor Fs
Pipe Properties (Gost Std)		
<u>Write Gost Values</u>	• Pipe Roughness Ra • Initial Radius r • Intercontrol Interval H	Configured Pipe Roughness Ra , Intial Radius r and Intercontrol Interval H for Gost Standard

Standard Flow Setup – Manual Input		
Key: Plain = Read only **Bold** = Configurable **<u>Bold underline</u>** = Method ***Bold italic*** = Table or graph		
Manual Input		
Manual Input Dens		**Manual Input Density Value**
Manual Input Viscos		**Manual Input Viscosity Value**
Manual Input Cd		**Manual Input Discharge Coeff Value (Cd)**
Manual Input Exp Factor Y		**Manual Input Expan Factor value (Y)**
Manual Input Temp Exp Fact Fa		**Manual Input Temp Exp Fact Value (Fa)**
<u>Write Density, Viscosity, Cd values</u>	• Manual input density value • Manual input viscosity value • Manual input Coefficient of Discharge (Cd) value	
Write Expansion Factors Y and Fa	• Gas expansion factor (Y) • Material Thermal Expansion factor (Fa)	

Standard Flow Setup – Simulation Values		
Key: Plain = Read only **Bold** = Configurable **<u>Bold underline</u>** = Method ***Bold italic*** = Table or graph		
Simulation Values		
Simulate DP	• **ON** • **OFF**	Simulate DP value
Simulate SP	• **ON** • **OFF**	Simulate SP value
Simulate PT	• **ON** • **OFF**	Simulate Process Temp value
Simulate Flow	• **ON** • **OFF**	Simulate Flow value

Table 20 – Device Variable Mapping

Device Variable Mapping parameters		
Key: Plain = Read only **Bold** = Configurable **<u>Bold underline</u>** = Method ***Bold italic*** = Table or graph		
Primary Variable	• Differential Pressure • Static Pressure • Process Temperature • Flow	
Secondary Variable	• Differential Pressure • Static Pressure • Temperature • Flow • Meter body Temperature	
Tertiary Variable	• Differential Pressure • Static Pressure • Temperature • Flow • Meter body Temperature	
Quaternary Variable	• Differential Pressure • Static Pressure • Temperature • Flow • Meter body Temperature	
Differential Pressure Unit	• inH2O (68oF) • inHg (0oC) • ftH2O (68oF) • mmH2O (68oF) • mmHg (0oC) • psi • bar • mbar • g/cm2 • kg/cm2 • Pa • kPa • Torr • Atm • inH2O@60oF • MPa • inH2O@4oC (39.2 oF • mmH2O@4oC (39.2oF)	
Static Pressure Unit	• inH2O (68oF) • inHg (0oC) • ftH2O (68oF) • mmH2O (68oF) • mmHg (0oC) • psi • bar • mbar • g/cm2 • kg/cm2 • Pa • kPa • Torr • Atm • inH2O@60oF • MPa • inH2O@4oC (39.2 oF • mmH2O@4oC (39.2oF)	

Temperature Unit	• degC • degF • degR • Kelvin	
Flow Unit	When Flow Output Type is Mass Flow: • g/sec • g/min • g/h • kg/sec • kg/min • kg/h • t/min [Metric tons] • t/h [Metric tons] • lb/sec • lb/min • lb/h When Flow Output Type is Volume Flow: • m3/h • m3/min • m3/sec • m3/day • gal/min • gal/h • gal/day • l/min • l/h • ft3/min • ft3/sec • ft3/h • bbl/day	

Table 21 – Differential Pressure Configuration

Differential Pressure parameters		
Key: Plain = Read only **Bold** = Configurable <u>**Bold underline**</u> = Method ***Bold italic*** = Table or graph		
Differential Pressure Configuration		
DP Value		The current value of the Differential Pressure input
DP Unit		The user selected engineering unit for the Differential Pressure input
DP LRV		The Lower Range Value for the Differential Pressure input (which represents 0% output) in user selected engineering units. This value may be configured to any value within the range DP LTL to DP UTL.
DP URV		The Upper Range Value for the Differential Pressure input (which represents 100% output) in user selected engineering units. This value may be configured to any value within the range DP LTL to DP UTL.

DP Damp		Damping value for the Differential Pressure output. Entries may be any value from 0.00 to 32.00 seconds.
DP URL		The Upper Range Limit for the Differential Pressure input
DP LRL		The Lower Range Limit for the Differential Pressure input
DP UTL		The Upper Transducer Limit for the Differential Pressure input
DP LTL		The Lower Transducer Limit for the Differential Pressure input
<u>Write DP Range Values</u>	• DP LRV • DP URV	Write a new Lower Range Value and Upper Range Value for the Differential Pressure

Table 22 – Static Pressure Configuration

Static Pressure Configuration parameters		
Key: Plain = Read only **Bold** = Configurable **<u>Bold underline</u>** = Method ***Bold italic*** = Table or graph		
Static Pressure Configuration		
SP Value		The current value of the Static Pressure input
SP Unit		The user selected engineering unit for the Static Pressure input
SP LRV		The Lower Range Value for the Static Pressure input (which represents 0% output) in user selected engineering units. This value may be configured to any value within the range SP LTL to SP UTL.
SP URV		The Upper Range Value for the Static Pressure input (which represents 100% output) in user selected engineering units. This value may be configured to any value within the range SP LTL to SP UTL.
SP Damp		Damping value for the Static Pressure output. Entries may be any value from 0.00 to 32.00 seconds.
SP URL		The Upper Range Limit for the Static Pressure input
SP LRL		The Lower Range Limit for the Static Pressure input
SP UTL		The Upper Transducer Limit for the Static Pressure input
SP LTL		The Lower Transducer Limit for the Static Pressure input
<u>Write SP Range Values</u>	• SP LRV • SP URV	Write a new Lower Range Value and Upper Range Value for the Static Pressure

Table 23 – Process Temperature Configuration

Process Temperature Configuration parameters		
Key: Plain = Read only **Bold** = Configurable **<u>Bold underline</u>** = Method ***Bold italic*** = Table or graph		
Process Temperature Configuration		
Sensor Type		The type of sensor (RTD or TC) selected for measuring the Process Temperature.
Sensor Id		The specific type of RTD or TC selected for measuring the Process Temperature
<u>Change Sensor Type/Id</u>	• **Enter Sensor Type** • **Enter Sensor ID**	Enter a new selection for the temperature sensor
<u>CJ Compensation Type*</u>		Select fixed or internal cold junction compensation for the Process Temperature measurement.
CJ Selection*		The selected value for Cold Junction compensation type.
Fixed CJ Compensation Value*		When fixed CJ compensation is selected, this value represents the fixed cold junction temperature to be used for the Process Temperature measurement.
Sensor Scratch Pad		Up to 32 alphanumeric characters for customer use
Break Detect		Allows user to enable or disable sensor break detection capability for the Process Temperature input
Latching Alarm		Allows user to enable or disable critical status latching when a break is detected in the temperature sensor
Acknowledge Latch		When break detection is set to enabled, the Acknowledge Latch permits the user to clear the Input Open critical status after repairing a break in the sensor without resetting the device.
PT Value		The current value of the Process Temperature input
PT Unit		The user selected engineering unit for the Process Temperature input
PT LRV		The Lower Range Value for the Process Temperature input (which represents 0% output) in user selected engineering units. This value may be configured to any value within the range PT LTL to PT UTL.
PT URV		The Upper Range Value for the Process Temperature input (which represents 100% output) in user selected engineering units. This value may be configured to any value within the range PT LTL to PT UTL.
PT Damp		Damping value for the Process Temperature output. Entries may be any value from 0.00 to 32.00 seconds.
PT URL		The Upper Range Limit for the Process Temperature input
PT LRL		The Lower Range Limit for the Process Temperature input
PT UTL		The Upper Transducer Limit for the Process Temperature input
PT LTL		The Lower Transducer Limit for the Process Temperature input

<u>Write PT Range Values</u>	o PT LRV o PT URV	Write a new Lower Range Value and Upper Range Value for the Process Temperature input
PT Config Params		
<u>Write RTD Type</u>**		Select 2-wire, 3-wire or 4-wire RTD sensor type to be used for measuring the Process Temperature
RTD Type**		The currently selected 2-wire, 3-wire or 4-wire RTD type
Temperature Sensor Install Date		The customer-entered Temperature Sensor Install Date. One time writable.
Lower Calib Point		The Lower Calibration Point value to be used for calibrating the Process Temperature Lower Calibration range.
Upper Calib Point		The Upper Calibration Point value to be used for calibrating the Process Temperature Upper Calibration range.
Sensor Bias		The RTD sensor bias in ohms if required for Process Temperature measurement.

* for T/C sensor configurations only
** for RTD sensor configurations only

Table 24 – Flow Configuration

Flow Configuration parameters		
Key: Plain = Read only **Bold** = Configurable **<u>Bold underline</u>** = Method ***Bold italic*** = Table or graph		
Flow Configuration		
Flow Value		The current value of the calculated Flow
Flow Unit		The user selected engineering unit for the Flow value
Flow LRV		The Lower Range Value for the Flow input (which represents 0% output) in user selected engineering units. This value may be configured to any value within the range Flow LTL to Flow UTL.
Flow URV		The Upper Range Value for the Flow input (which represents 100% output) in user selected engineering units. This value may be configured to any value within the range Flow LTL to Flow UTL.
Flow Damp		Damping value for the Flow output. Entries may be any value from 0.00 to 32.00 seconds.
Flow URL		The Upper Range Limit for the Flow input
Flow LRL		The Lower Range Limit for the Flow input
<u>Write Flow Range values</u>	• Flow LRV • Flow URV	Write a new Lower Range Value and Upper Range Value for the Flow input
Flow Cutoff Lo		The lower value for Low Flow cutoff. When the flow drops below this value, the flow output will be forced to 0%.
Flow Cutoff Hi		The upper value for Low Flow cutoff. The flow will not exit the low flow cutoff state (0% flow) until the flow exceeds this value.
<u>Write Flow Cutoff Values</u>	• Flow Cutoff Lo • Flow Cutoff Hi	Allows the user to configure new values for the low and high cutoff limits for the Low Flow Cutoff option

Table 25 – Meter body Temperature Configuration

Meter Body Temperature Configuration parameters		
Key: Plain = Read only **Bold** = Configurable **<u>Bold underline</u>** = Method ***Bold italic*** = Table or graph		
Meter body Temperature Configuration		
MBT Value		The current value of the measured Meter body Temperature
MBT Unit		The engineering unit for the Meter body Temperature value
MBT LRV		The Lower Range Value for the Meter body Temperature input
MBT URV		The Upper Range Value for the Meter body Temperature input
MBT Damp		Damping value for the Meter body Temperature measurement. Entries may be any value from 0.00 to 32.00 seconds.
MBT URL		The Upper Range Limit for the Meter body Temperature value
MBT LRL		The Lower Range Limit for the Meter body Temperature value

Table 26 – Process Variables

Process Variable parameters		
Key: Plain = Read only **Bold** = Configurable **Bold underline** = Method ***Bold italic*** = Table or graph		
PV is		The process variable currently selected as the Primary Variable. Options are: • Differential Pressure • Static Pressure • Process Temperature • Flow
PV Value		The current value of the Primary Variable
PV Unit		The user selected engineering unit for the Primary Variable
SV is		The process variable currently selected as the Secondary Variable. Options are: • Differential Pressure • Static Pressure • Process Temperature • Flow
SV Value		The current value of the Secondary Variable
SV Unit		The user selected engineering unit for the Secondary Variable
TV is		The process variable currently selected as the Tertiary Variable. Options are: • Differential Pressure • Static Pressure • Process Temperature • Flow
TV Value		The current value of the Tertiary Variable
TV Unit		The user selected engineering unit for the Tertiary Variable
QV is		The process variable currently selected as the Quaternary Variable. Options are: • Differential Pressure • Static Pressure • Process Temperature • Flow
QV Value		The current value of the Quaternary Variable
QV Unit		The user selected engineering unit for the Quaternary Variable
MBT Value		The current measured value of the Meter body Temperature
ET		The current measured value of the Communications board Electronics Temperature
PV Loop current		The current value of the analog loop current as a reflection of the Primary Variable input with respect to configured range
PV % range		The current percentage value of the device output as a reflection of the Primary Variable input with respect to configured range

Table 27 - Calibration

Calibration parameters		
Key: Plain = Read only **Bold** = Configurable **<u>Bold underline</u>** = Method ***Bold italic*** = Table or graph		
Calibration		
Factory Calibration Select		
DP Factory Calib Select		
Factory Cal Available DP		Lists the available custom Differential Pressure calibrations available for the device (three custom calibrations A,B,C are available when the device is purchased)
SP Factory Calib Select		
Factory Cal Available SP		Lists the available custom Differential Pressure calibrations available for the device (three custom calibrations A,B,C are available when the device is purchased)
Filter Performance	• Standard SOR • Fast SOR	Configuration option for Standard or Fast Speed of Response
<u>Apply Values</u>	• **Set 4 ma value** • **Set 20 ma value**	Performs a Set LRV and/or Set URV to configure the LRV/URV to applied inputs. Prompts the user to supply a Primary Variable input equivalent to the desired Lower Range Value (LRV) associated with the 4ma output. A Set LRV is performed to the applied input. The user is then prompted to supply a Primary Variable input equivalent to the desired Upper Range Value (URV) associated with the 20ma output. A Set URV is performed to the applied input.
<u>D/A Trim</u>		Perform an analog output calibration at 4.00 and 20.00 mA (0% and 100% output). Prompts the user to connect a reference meter to calibrate the DAC 4-20 ma output. The output is first set to 4ma and the user enters the actual current measured to calibrate the DAC zero. The output is then set to 20 ma and the user follows the same procedure to calibrate the DAC span.
PT Calibration		
<u>PT URV Correct</u>		URV Correct: perform an input calibration correction by applying process input at the configured URV level
<u>PT LRV Correct</u>		LRV Correct: perform an input calibration correction by applying process input at the configured LRV level
<u>PT Reset Corrects</u>		Clear all user calibration adjustments
PT Correct URV Records	**PT <u>Prev URV Correct</u>**	Displays the Date and Time of previous URV correct done displayed in mm/dd/yyyy format
	PT <u>Last URV Correct</u>	Displays the Date and Time of last URV correct done displayed in mm/dd/yyyy format
	PT <u>Curr URV Correct</u>	Displays the Date and Time of current URV correct done displayed in mm/dd/yyyy format

PT Correct LRV Records	**PT <u>Prev LRV Correct</u>**	Displays the Date and Time of previous LRV correct done displayed in mm/dd/yyyy format
	PT <u>Last LRV Correct</u>	Displays the Date and Time of last LRV correct done displayed in mm/dd/yyyy format
	PT <u>Curr LRV Correct</u>	Displays the Date and Time of current LRV correct done displayed in mm/dd/yyyy format
PT Reset Corrects Records	**PT <u>Prev Corrects Rec</u>**	Displays the Date and Time of current Reset corrects done displayed in mm/dd/yyyy format
	PT <u>Last Corrects Rec</u>	Displays the Date and Time of last Reset corrects done displayed in mm/dd/yyyy format
	PT <u>Curr Corrects Rec</u>	Displays the Date and Time of current Reset corrects done displayed in mm/dd/yyyy format
DP Calibration		
<u>DP URV Correct</u>		URV Correct: perform an input calibration correction by applying process input at the configured URV level
<u>DP LRV Correct</u>		LRV Correct: perform an input calibration correction by applying process input at the configured LRV level
<u>DP Reset Corrects</u>		Clear all user calibration adjustments
<u>DP Zero Trim</u>		perform an input calibration correction by applying process input at zero
DP Zero Trim Records	**<u>DP Prev Zero Correct</u>**	Displays the Date and Time of previous zero trim field calibration displayed in mm/dd/yyyy format
	<u>DP Last Zero Correct</u>	Displays the Date and Time of last zero trim field calibration displayed in mm/dd/yyyy format
	<u>DP Curr Zero Correct</u>	Displays the Date and Time of current zero trim field calibration displayed in mm/dd/yyyy format
DP Correct URV Records	**<u>DP Prev URV Correct</u>**	Displays the Date and Time of previous URV correct done displayed in mm/dd/yyyy format
	<u>DP Last URV Correct</u>	Displays the Date and Time of last URV correct done displayed in mm/dd/yyyy format
	<u>DP Curr URV Correct</u>	Displays the Date and Time of current URV correct done displayed in mm/dd/yyyy format
DP Correct LRV Records	**<u>DP Prev LRV Correct</u>**	Displays the Date and Time of previous LRV correct done displayed in mm/dd/yyyy format
	<u>DP Last LRV Correct</u>	Displays the Date and Time of last LRV correct done displayed in mm/dd/yyyy format
	<u>DP Curr LRV Correct</u>	Displays the Date and Time of current LRV correct done displayed in mm/dd/yyyy format

DP Reset Corrects Records	**<u>DP Prev Corrects Rec</u>**	Displays the Date and Time of current Reset corrects done displayed in mm/dd/yyyy format
	<u>DP Last Corrects Rec</u>	Displays the Date and Time of last Reset corrects done displayed in mm/dd/yyyy format
	<u>DP Curr Corrects Rec</u>	Displays the Date and Time of current Reset corrects done displayed in mm/dd/yyyy format
SP Calibration		
<u>SP URV Correct</u>		URV Correct: perform an input calibration correction by applying process input at the configured URV level
<u>SP LRV Correct</u>		LRV Correct: perform an input calibration correction by applying process input at the configured LRV level
<u>SP Reset Corrects</u>		Clear all user calibration adjustments
<u>SP Zero Trim</u>		perform an input calibration correction by applying process input at zero
SP Zero Trim Records	**<u>SP Prev Zero Correct</u>**	Displays the Date and Time of previous zero trim field calibration displayed in mm/dd/yyyy format
	<u>SP Last Zero Correct</u>	Displays the Date and Time of last zero trim field calibration displayed in mm/dd/yyyy format
	<u>SP Curr Zero Correct</u>	Displays the Date and Time of current zero trim field calibration displayed in mm/dd/yyyy format
SP Correct URV Records	**<u>SP Prev URV Correct</u>**	Displays the Date and Time of previous URV correct done displayed in mm/dd/yyyy format
	<u>SP Last URV Correct</u>	Displays the Date and Time of last URV correct done displayed in mm/dd/yyyy format
	<u>SP Curr URV Correct</u>	Displays the Date and Time of current URV correct done displayed in mm/dd/yyyy format
SP Correct LRV Records	**<u>SP Prev LRV Correct</u>**	Displays the Date and Time of previous LRV correct done displayed in mm/dd/yyyy format
	<u>SP Last LRV Correct</u>	Displays the Date and Time of last LRV correct done displayed in mm/dd/yyyy format
	<u>SP Curr LRV Correct</u>	Displays the Date and Time of current LRV correct done displayed in mm/dd/yyyy format
SP Reset Corrects Records	**<u>SP Prev Corrects Rec</u>**	Displays the Date and Time of current Reset corrects done displayed in mm/dd/yyyy format
	<u>SP Last Corrects Rec</u>	Displays the Date and Time of last Reset corrects done displayed in mm/dd/yyyy format
	<u>SP Curr Corrects Rec</u>	Displays the Date and Time of current Reset corrects done displayed in mm/dd/yyyy format
Req Calib Sel DP		Allows selection of one of the available custom factory calibrations for Differential Pressure
Active Calibration DP		The currently selected custom factory calibration (A,B, C) for Differential Pressure

CAL A URV		The Upper Range Value used for the custom St Differential Pressure calibration for range A
CAL A LRV		The Lower Range Value used for the custom Differential Pressure calibration for range A
CAL B URV		The Upper Range Value used for the custom Differential Pressure calibration for range B (listed only if available)
CAL B LRV		The Lower Range Value used for the custom Differential Pressure calibration for range B (listed only if available)
CAL C URV		The Upper Range Value used for the custom Differential Pressure calibration for range C (listed only if available)
CAL C LRV		The Lower Range Value used for the custom Differential Pressure calibration for range C (listed only if available)
Req Calib Sel SP		Allows selection of one of the available custom factory calibrations for Static Pressure
Active Calibration SP		The currently selected custom factory calibration (A,B, C) for Static Pressure
CAL A URV		The Upper Range Value used for the custom Static Pressure calibration for range A
CAL A LRV		The Lower Range Value used for the custom Static Pressure calibration for range A
CAL B URV		The Upper Range Value used for the custom Static Pressure calibration for range B (listed only if available)
CAL B LRV		The Lower Range Value used for the custom Static Pressure calibration for range B (listed only if available)
CAL C URV		The Upper Range Value used for the custom Static Pressure calibration for range C (listed only if available)
CAL C LRV		The Lower Range Value used for the custom Static Pressure calibration for range C (listed only if available)

Table 28 – Device Status

Critical	*DAC Failure*	
	Config Data Corrupt	
	SIL Diagn Failure	
	Sensor Critical Failure	
	COMM VCC Failure	
Help Critical Diagnostics	*Help-Electronic Module Dac Failure*	
	Help-Config Fata Corrupt	
	Help-SIL Diag Failure	
	Help-Sensor Critical Failure	
	Help-COMM VCC Failure	
Non Critical 1	*Local Display Failure*	
	Comm Section Non Critical Failure	
	Sensing Section Non Critical Failure	
	CJ Out Of Limit	
	Fixed Current Mode	
	PV Out of Range	
	No Factory Calibration	
	No DAC Compensation	
Help Non Critical Diagnostics	*Help-local Display*	
	Help-Comm Section Non Critical Failure	
	Help-Sensing Section Non Critical Failure	
	Help-CJ Out Of Limit	
	Help-Fixed Current Mode	
	Help-PV Out OF Range	
	Help_No Factory Calibration	
	Help- No DAC Compensation	
Non Critical 2	*LRV Set Err. Zero Config button*	
	LRV Set Err. Span Config button	
	AO Out of Range	
	Loop Current Noise	
	Sensor Unreliable Comm	
	Tamper Alarm	
	No DAC Calibration	
	Low Supply Voltage	
Help Non Critical Diagnostics	*Help-LRV Set Err. Zero Config button*	
	Help-LRV Set Err. Span Config button	
	Help-AO Out of Range	
	Help-Loop Current Noise	
	Help-Sensor Unreliable Comm	
	Help-Tamper Alarm	
	Help-No DAC Calibration	
	Help-Low Supply Voltage	
Non Critical 3	*Sensor Over Temperature*	
	Sensor Input Open	
	Sensor in Low Power Mode	
	Sensor Input Out of Range	
	DP/SP/PT/Flow Simulation Mode	
	Flow Calculation Details	
Help Non Critical Diagnostics	*Help-Sensor Over Temperature*	
	Help-Sensor Input Open	
	Help-Sensor in Low Power Mode	
	Help-Sensor Input Out of Range	
	Help-DP/SP/PT/Flow Simulation Mode	

	Help-Flow Calculation Details	
Ext Dev Status	*Maintenance Required*	
	Device Variable Alert	
	Critical Power Failure	
Help-Ext dev Status	*Help-Maintenance Required*	
	Help-Device Variable Alert	
Additional Status	***DAC Failure***	Temp Above 100C
		Temp Above 140C
		DAC Under Current Status
		DAC Over Current Status
		DAC Packet Error
		DAC SPI Fail
	Communication	RAM Failure
		ROM Failure
		Program Flow Failure
		Brownout Status
		DAC Write Failure
		Low Transmitter Supply
	Display	Display Communication Failure
		Display NVM Corrupt
	Sensors	Pressure Sensing Failure
		Pressure NVM Corrupt
		Pressure Sensor Comm Timeout
		Temperature Sensing Failure
		Temperature Calibration Corrupt
		Temperature Sensor Comm Timeout
	Temperature	CJ CT Delta Warning
		Temp ADC0 Range Fault
		Temp ADC1 Range Fault
		Temp ADC Reference Fault
		Temp Unreliable Comm
		Temp No Factory Calibration
		Temperature sensor over temperature
	Temperature	Low Sensor Supply
		Sensor NVM Corrupt
		Sensor Characterization CRC Fault
		Sensor/CJ Bad
		Suspect Input
		RAM Failure In Sensor
		ROM Failure In Sensor
		Program Flow Failure In Sensor
	Temperature	Excess Cal Correction
		Character Calc Error
		Sensor Bad
		CJ Bad
		Sensor1 Input Fault
	Pressure	Low Sensor Supply
		Meter body Failure
		Sensor Characterization Corrupt
		DP/MBT/SP/PT/Flow Bad
		Suspect Input
		Sensor RAM Corrupt
		Sensor Code Corrupt
		Sensor Flow Failure

Additional Status *(continued)*	***Pressure***	Excess Zero Correction
		Excess Span Correction
		Char Calc Error
		Sensor Overload
		Sensor RAM DB Fault
		Pressure No Factory Calibration
		Pressure Unreliable Comm
		Pressure Over Temperature
	Pressure	Bad DP
		Bad MBT
		Bad SP
		Bad PT
		BAD FLOW
	Comm NVM	Common DB Corrupt
		Vital Config Corrupt
		General Config DB Corrupt
		Config Change DB Corrupt
		Adv Diag DB Corrupt
		Display View Config DB Corrupt
		Display Common Config DB Corrupt
	Display NVM	Display View 1 Corrupt
		Display View 2 Corrupt
		Display View 3 Corrupt
		Display View 4 Corrupt
		Display View 5 Corrupt
		Display View 6 Corrupt
		Display View 7 Corrupt
		Display View 8 Corrupt
	Flow	Divided By Zero
		Sqrt Of Negative
		Reverse Flow
		PV4 Bad SP/PT Compensation
		DP Simulation Mode
		SP Simulation Mode
		PT Simulation Mode
		Flow Simulation Mode

Table 29 – Diagnostics

Adv Diagnostics	Write Install Dates	MB Install Date
		TM Install Date
	Modules	Comm Module - Operating Voltage ○ Current output Voltage ○ Min. Output Voltage ○ TimeStamp at Low Voltage ○ Reset Voltage and TimeStamp - Power Up Diagnostics ○ Power Cycles ○ Power Cycle TimeStamp - ET Tracking ○ Max ET Limit ○ Max ET Value ○ ET Up Cnt ○ Min ET Limit ○ Min ET Value ○ ET Dn Cnt ○ ET Upper Limit ○ ET Up Time ○ ET Lower Limit ○ ET Dn Time
		Temperature Module - ET Tracking ○ Max ET Value ○ ET Up Cnt ○ Min ET Value ○ ET Dn Cnt ○ ET Dn Time ○ ET Up Time - Delta Tracking ○ CT-CJ Delta Max Value ○ CT-CJ Delta Value ○ CT-CJ Delta Up Count ○ CT-CJ Delta Min Value ○ CT-CJ Delta Down Count ○ CT-CJ Down TimeStamp ○ CT-CJ Up TimeStamp - PT Tracking ○ PT Low Alarm Limit ○ PT Low Alarm Counter ○ PT High Alarm Limit ○ PT High Alarm Counter ○ PT Low Value & TimeStamp ○ PT High Value & TimeStamp ○ Change PT Alarm Limits ○ Reset PT Tracking Values - AVDD ○ Max AVDD Value ○ Min AVDD Value ○ AVDD Up TimeStamp ○ AVDD Down TimeStamp
		Pressure Module - DP Tracking ○ DP Max ○ DP Up Count ○ DP Min ○ DP Down Count ○ DP Up Limit ○ DP Up TimeStamp

Adv Diagnostics	Modules	○ DP Down Limit ○ DP Down TimeStamp - SP Tracking ○ SP Max ○ SP Up Count ○ SP Up Limit ○ SP Up TimeStamp - ET Tracking ○ Max ET Value ○ ET Up Count ○ Min ET Value ○ ET Down Count ○ ET Down TimeStamp ○ ET Up TimeStamp - MBT Tracking ○ Max MBT Value ○ MBT Up Count ○ Min MBT Value ○ MBT Down Count ○ MBT Up Limit ○ MBT Up TimeStamp ○ MBT Down Limit ○ MBT Down TimeStamp - AVDD ○ Max AVDD Value ○ Min AVDD Value ○ AVDD Down TimeStamp ○ AVDD Up TimeStamp
Error Log	Error Log Flag	
	Show Error Log	
	Reset Error Log	
Config History	Displays last 5 configuration changes	

Table 30 - Services

Write Protect	
Tamper Mode	
Tamper Attempt Counter	
Tamper Latency	
Write PRotect On/Off	o **Enable** o **Disable (enter password)**
Change Password	o **Old password** o **New password**
Max Attempts	o **Enable/disable** o **Tamper latency** o **Maximum allowable attempts**
Configure Tamper Alarm	
Reset Tamper Counter	
Master Reset	o **Choose analog output level**
Loop Test	o **Lock** o **Unlock**
Lock/Unlock device	o **Enable** o **Disable (enter password)**

Items in **bold** are writable

Table 31 – Detailed setup

Signal Condition	PV Damp
	PV URV
	PV LRV
	PV URL
	PV LRL
	PV % rnge
	PV Loop Current
	PV Xfer fnctn
O/P Condition	Poll addr
	PV Loop current
	Loop current mode
	D/A trim
	PV Alm Type
NAMUR47	NAMUR Selection

Items in **bold** are writable

Table 32 – Meter body details

MB Type	
MB ID	
Key Number	
Table I Info	
Table II Info	
Input Type	o Temp Sensor Input o Temp Sensor Type
Digital Output	
Material Details	o Process Head Material o Diaphragm Material o Fill Fluid o Process Connection o Bolt/Nut Materials o Vent Head Type o Vent/Drain Location o Vent Material o Gasket Material
Connection Orientation	
Agency Approvals	
Tx Electronics Selections	o Electronic Housing Material o Connection Type

	o Lightning Protection o Analog Output o Digital Protocol o Customer Interface Indicator o Ext Zero, Span & Config Buttons o Languages
Configuration Selections	o Diagnostics o Write Protect o Failsafe o Hi & Lo Output Limits o General Configuration
Accuracy & Calibration	o Accuracy o Calibrated Range o Calibration Type
Accessory Selections	o Mounting Bracket Type o Mounting Bracket Material o Customer Tag o Unassembled Conduit Plugs & Adapters
Certifications & Warranty	
Factory Identification	

Items in **bold** are writable

Table 33 – Display setup

<table>
<tr><td rowspan="32">Screen Configuration</td><td rowspan="8">SelectScreens</td><td>Screen 1</td></tr>
<tr><td>Screen 2</td></tr>
<tr><td>Screen 3</td></tr>
<tr><td>Screen 4</td></tr>
<tr><td>Screen 5</td></tr>
<tr><td>Screen 6</td></tr>
<tr><td>Screen 7</td></tr>
<tr><td>Screen 8</td></tr>
<tr><td rowspan="4">Select PV Format</td><td>None</td></tr>
<tr><td>PV</td></tr>
<tr><td>PV&BarGraph</td></tr>
<tr><td>PV&Trend</td></tr>
<tr><td rowspan="9">SelectPV</td><td>DifferentialPressure</td></tr>
<tr><td>Static Pressure</td></tr>
<tr><td>Process Temparature</td></tr>
<tr><td>Flow</td></tr>
<tr><td>Meterbody Temparature</td></tr>
<tr><td>Sensor 1</td></tr>
<tr><td>Sensor1 Resistance</td></tr>
<tr><td>Loop Output</td></tr>
<tr><td>Percent Output</td></tr>
<tr><td rowspan="9">PVScaling</td><td>Differential Pressure
- None
- Convert Units
- Linear</td></tr>
<tr><td>Static Pressure
- None
- Convert Units
- Linear</td></tr>
<tr><td>Process Temperature
- None
- Convert Units</td></tr>
<tr><td>Flow
- None
- Convert Units
- Linear</td></tr>
<tr><td>Meterbody Temperature
- None
- Convert Units</td></tr>
<tr><td>Sensor 1
- None
- Convert Units</td></tr>
<tr><td>Sensor1 Resistance
- None</td></tr>
<tr><td>Loop Output
- None</td></tr>
<tr><td>Percent Output
- None
- Linear</td></tr>
<tr><td>Decimals</td><td>None
.x
.xx
.xxx</td></tr>
<tr><td>CustomTag</td><td>Max. 14 Chars</td></tr>
<tr><td rowspan="4">Common Setup</td><td>Language</td><td></td></tr>
<tr><td>Rotation Time</td><td></td></tr>
<tr><td>Contrast Level</td><td></td></tr>
<tr><td>Screen Rotation</td><td></td></tr>
</table>

<table>
<tr><td rowspan="2">Read Screen Info</td><td>Screen Info</td><td>Screen Number
Custom Tag
Chart High Limit
Chart Low Limit
Scaling Low Limit
Scaling High Limit
Screen Format
PV Selection
Display Units
Decimals
PV Scaling
Trend Duration
Custom Unit</td></tr>
<tr><td>Configure Advanced Display Screen</td><td></td></tr>
<tr><td>Display Connected</td><td></td><td></td></tr>
<tr><td>Display Type</td><td></td><td></td></tr>
<tr><td>Display Format</td><td></td><td></td></tr>
</table>

Table 34 – Upgrade Options

Pay-For-Play Options
Device Id
Enter License key

Table 35 – Review

Manufacturer
Model
MB Type
Dev id
PV Unit
PV Damp
PV % rnge
PV Xfer fnctn
PV URV
PV LRV
DP LRV
DP URV
SPLRV
SPURV
PT LRV
PT URV
FLOW LRV
FLOW URV
MBT LRV
MBT URV
DP URL
DP LRL
DP UTL
DP LTL
SP URL
SP LRL
SP UTL

SP LTL
PT URL
PT LRL
PT UTL
PT LTL
Flow URL
Flow LRL
MBT URL
MBT LRL
DP Value
SP Value
PT Value
Flow Value
MBT Value
CJT Value
DP Damp
SP Damp
PT Damp
Flow Damp
MBT Damp
Loop current mode
PV Alrm typ
PV Loop current
SV Unit
TV Unit
QV Unit
MB ID
Tx Type
Sensor Scratch Pad
Tag
Long TAg
Date
Descriptor
Message
Write Protect
Final asmbly num
Universal rev
Fld dev rev
Software Rev
Display SW Rev
Temp Sensor SW Rev
Dev SW Rev
MB SW Rev
Poll addr
Cnfg chng count
Num Req Preams
Temparature Controlled By
Temparature Control Mode
Temp Tx Install Date
Temp Sensor Install Date
Tx Install Date
Power Cycles

Table 36 – Tamper Reporting Logic Implementation with Write Protect

Write Protect Jumper Status	Write Protect Software Status	Configuration Change Allowed?
ON	ON or OFF	NO
OFF (or missing)	ON	NO
OFF (or missing)	OFF	YES

Tamper Reporting Status	Tamper Alerted Posted?
ON	YES
OFF	NO

Note that Tamper Reporting is independent of Write Protect status.

The sections below give some examples as to how to edit the configuration parameters and execute Methods.

6.2.10 Procedure to Enter the Transmitter Tag

1. From the **My Device** menu, make the following menu selections:

   Shortcuts > Main menu > Basic Setup > Device Information > Tag.
2. Click **Edit**. The **Tag** screen will be displayed.
3. Key in the tag name (for example: SMV 800) which can be a maximum of eight characters.
4. Click **OK**. The **Send to Device** screen will be displayed.
5. Select the **Tag** check box.
6. Click **Send** to download the change to the Transmitter, or Click **Return** to continue making changes.

6.2.11 Selecting the Process Variable (PV) Differential Pressure (DP) unit of measurement

See section 6.2.14 for Selection Process variables (PV) Unit of Temperature measurement

Engineering units affect the values of the LRV, URV and the LRL and the URL. After changing the PV engineering units to the Transmitter, verify changes to the units parameter, the LRV, and the URV.

The pressure measurement can be displayed in one of the pre-programmed engineering units.

1. From **My Device** menu, make the following menu selections:

   Shortcuts > Main Menu > Device Variable Mapping > PV Units
2. Click **Edit.** You will be warned that if you change the value of the variable it will change the loop current, which may upset the control process.
3. Click **Yes** to continue. The PV Unit screen will be displayed with a list of measurement units, as follows:

inH_2O	psi	Pa	$inH_2O@4^oC$
inHg	bar	kPa	$mmH_2O@4^oC$
ftH_2O	mbar	Torr	–
mmH_2O	g/cm^2	Atm	–
mmHg	kg/cm^2	MPa	

4. Select the desired **PV Unit**, and click **OK**. A Post Edit action message will be displayed, indicating if you select this value, the variables that use it as the units code will start in the previous units until this value is sent to the Transmitter.
5. Click **OK** to continue or **Abort** to discard the change.
6. Click **Send**. The Send to Device screen will be displayed.
7. Select the **PV Unit** check box.
8. Click **Send** to download the change to the Transmitter or **Return** to continue making changes.

6.2.12 Setting PV URV, and LRV Range Values (for DP values)

SMV 800 Transmitters are calibrated at the factory with ranges using inH_2O at 39.2°F (4°C). For a reverse range, enter the upper range value as the LRV and the lower range value as the URV.
When setting the range using applied pressure, the URV changes automatically to compensate for any changes in the LRV. When using the Tookit keyboard, the URV does not change automatically. To use the applied pressure method and change both the LRV and URV, **change the LRV first**.

The LRV and URV values can be entered with the Toolkit keypad or by applying the corresponding pressure values directly to the Transmitter. Use the following procedure to key in the range values. The procedure uses an example of 5 to 45 referenced to inH_2O.

- Starting at the My Device menu, make the following menu selections:
  Shortcuts > SMV800Mainmenu > Differential Pressure Configuration > Write DP Range Values
- To edit the LRV and URV values directly select “Write DP Range values” see Table 21, and follow these steps:
  1. Prompt to enter URV value
  2. Enter URV value and click on OK
  3. Prompt to enter LRV value
  4. Enter LRV value and click on OK

On clicking the OK button the method is complete and LRV and URV values are updated with new values

6.2.13 Setting Range Values for Applied Pressure for DP

When setting the range values using applied pressure, the URV changes automatically to compensate for any changes in the LRV and to maintain the present span (URV – LRV).
When entering the LRV using the Tookit keypad, the URV does not change automatically.
If you use the applied pressure method, and need to change the LRV and URV, **change the LRV first**. You can also use the local zero and span adjustments on the Transmitter to set the LRV and URV values.

1. Starting at the **My Device** menu, make the following menu selections:
   Shortcuts > Main Menu > Calibration > DAC Calibration >Apply Values
2. Click **Execute**. You will be warned to remove the loop from automatic control. After doing so, press **OK** to continue.
3. Select **4mA** from the list, and then click **OK**. A message will prompt you to apply a new 4 mA input.
4. Click **OK**; otherwise, click **Abort**.
5. When the **Current applied process value:** is displayed, choose **Select as 4mA value**, and click **OK**.
6. Repeat steps 2 through 4 to set the URV to the applied input pressure for 20 mA output.
7. Click **Return** to go back to the Calibration menu.

8. Click **Send**. The Send to Device screen will be displayed.
9. Select the **Apply Values** check-box.
10. Click **Send** to download the change to the Transmitter, or click **Return** to continue making changes.

6.2.14 Selecting the Process Variable (PV) Unit of Temperature Measurement

Engineering units affect the values of the LRV and URV. After changing the PV engineering units to the Transmitter, verify changes to the units paramter, the LRV, and the URV.

The Temperature measurement can be displayed in one of the pre-programmed engineering units.

1. From **My Device** menu, make the following menu selections:

   Shortcuts > Device Setup > Basic Setup > PV Units
2. Click **Edit.** You will be warned that if you change the value of the variable it will change the loop current, which may upset the control process.
3. Click **Yes** to continue. The PV Unit screen will be displayed with a list of measurement units, as follows:

   Deg C
   Deg F
   Deg R
   Kelvin
4. Select the desired **PV Unit**, and click **OK**. A Post Edit action message will be displayed, indicating if you select this value, the variables that use it as the units code will start in the previous units until this value is sent to the Transmitter.
5. Click **OK** to continue or **Abort** to discard the change.
6. Click **Send**. The Send to Device screen will be displayed.
7. Select the **PV Unit** check box.
8. Click **Send** to download the change to the Transmitter or **Return** to continue making changes.

6.2.15 Setting URV, and LRV Range Values

SMV800 Transmitters are calibrated at the factory with ranges for PV, SV, TV, QV

The LRV and URV values can be entered with the Toolkit keypad or by applying the corresponding Range values directly to the Transmitter. Use the following procedure to key in the range values.

1. Starting at the My Device menu, make the following menu selections:
   > Device Setup > Diff Pressure Config > Write DP Range values Method
2. Enter the URV value in the field next to "Enter DP URV Value" (for changing URV for Diff Pressure Config)
3. Enter the LRV value in the field next to "Enter DP LRV Value" (for changing LRV for Diff Pressure Config)
4. Method will complete with the message "DP URV LRV values written successfully"
5. Follow the similar procedure for changing URV, LRV for SP, Temperature and Flow by following Static Pressure Config, Process Temp Config, Flow Config under Device Setup menu

6.2.16 Setting Range Values for Applied Temperature

When setting the range values using applied Temperature, the URV changes automatically to compensate for any changes in the LRV and to maintain the present span (URV – LRV). When entering the LRV using the Tookit keypad, the URV does not change automatically. Same procedure can be followed for setting range values using Applied Pressure
If you use the applied temperature method, and need to change the LRV and URV, **change the LRV first**. You can also use the local zero and span adjustments on the Transmitter to set the LRV and URV values.

1. Starting at the **My Device** menu, make the following menu selections:
   > Device setup > Calibration > Calibration Methods > Apply values.
2. Click **Execute**. You will be warned to remove the loop from automatic control. After doing so, press **OK** to continue.
3. Select **4mA** from the list, and then click **OK**. A message will prompt you to apply a new 4 mA input.
4. Click **OK**; otherwise, click **Abort**.
5. When the **Current applied process value:** is displayed, choose **Select as 4mA value**, and click **OK**.
6. Repeat steps 2 through 4 to set the URV to the applied input Temperature for 20 mA output.
7. Click **Return** to go back to the Calibration menu.
8. Click **Send**. The Send to Device screen will be displayed.
9. Select the **Apply Values** check-box.
10. Click **Send** to download the change to the Transmitter, or click **Return** to continue making changes.

6.2.17 Saving device history

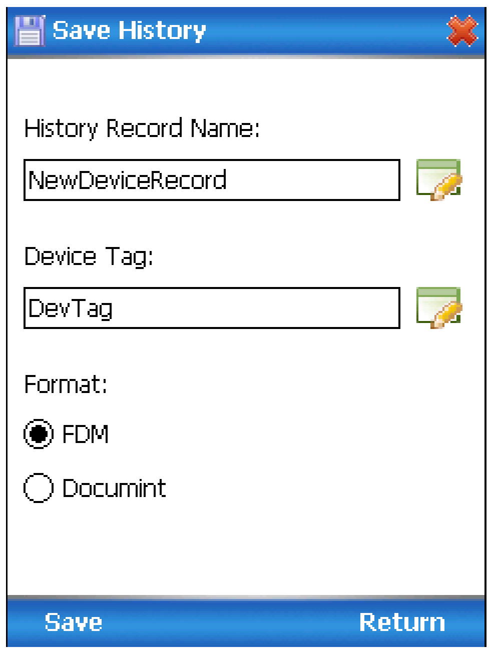
FDC provides you a feature wherein you can save the device configuration snapshot as history. This history record may then be transferred to a central asset management database such as FDM. Using this feature you can save the device configuration snapshot as device history of a connected device at any given time in a predefined location. The following are the features of save device history option.

- Two formats of history are supported: FDM and DocuMint.
- Only one snapshot per device instance is allowed to be saved and you can save the snapshot of a device any number of times overwriting the existing one.

To save device history, perform the following steps.

1. On Device Home page, tap Tools.
2. Select **Save History** and tap **Select**

The **Save History** page appears.

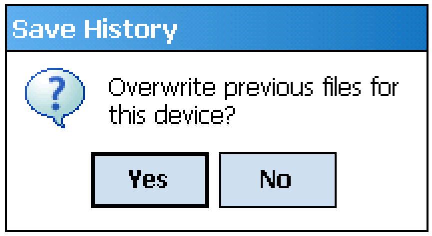


3. Enter the **History Record Name** using the keypad and tap **OK**. History Name field accepts alphanumeric characters, underscore, and no other special characters.
4. Enter the **Device Tag** using the keypad and tap **OK**. Device Tag field accepts alphanumeric characters, underscore, and no other special characters.

Note: The device can be identified with **History Record Name** and **Device Tag** in FDM, once the record is imported in FDM, provided the device is not already present in the FDM network.

5. Select the **Format**. The following are the available formats:
   - FDM
   - DocuMint
6. Tap **Save** to save device history record.

7. If a history record for this device already exists, the following warning message appears.



8. Tap **Yes** to overwrite the existing name. A overwrite success message appears.
9. Tap **OK** to return to **Device Home** page.

6.2.18 Exporting device history records to FDM

The history snapshot saved in FDC can be imported into FDM for record and audit purposes. This is enabled by the standard Import/Export wizard in FDM. This way FDM allows synchronizing the device configuration data through the MCT404 Toolkit handheld.

To export device history from FDC and import it in FDM, perform the following steps.

1. Connect your MCT404 Toolkit handheld to your computer as described earlier.
2. Browse to the folder on your computer, **SD Card** > **FDC** > **Resources** > **History**.
3. The FDC history records are named as per the following convention for the primary name:
   DeviceTag_ManufacturerIDDeviceTypeDeviceRevisionDDRevision_DeviceID
4. Copy the desired Device History Record files (with .fdm extension) from the above mentioned location to a temporary location on FDM Client computer.
5. Use FDM Import/Export wizard to import the history records into FDM. After you import successfully:
   - The snapshot would get imported into FDM database and appear as a history record for the corresponding device in FDM.
   - The Audit Trail entry for such a record identifies it as being imported through the MCT404 Toolkit handheld.
   - If the device is not part of any of the FDM configured networks, it would appear under ‘**Disconnected Devices’** in FDM network view.
   - All operations allowed on Device History Record in FDM will be allowed for the record imported through the MCT404 Toolkit handheld.

Note: For more details on using FDM Import/Export feature, refer to section Importing and Exporting Device History in FDM User’s Guide.

6.2.19 Exporting device history records to Documint

To export device history from FDC and import it in FDM, perform the following steps.

1. Connect your MCT404 Toolkit handheld to your computer as described earlier.
2. Browse to the folder on your computer, **SD Card > FDC > Resources > History**.
3. The FDC history records are named as per the following convention for the primary name:
   DeviceTag_ManufacturerIDDeviceTypeDeviceRevisionDDRevision_DeviceID
4. Copy the desired Device History Record files (with .xml extension) from the above mentioned location to a temporary location on the DocuMint system.
5. For Importing in DocuMint: Select Procedures > Import or the Import option in the tool bar.

Note: For more details on using DocuMint Import feature, refer to section Importing from XML File in Document Help.

6.2.20 Custom Views

FDC provides you a unique feature wherein you can choose what you want to view in a device and thus creating your own custom views. This is a very convenient utility when you are interested in select few variables in a device and saves you the time for navigating through the menus.
You can create two views per device type with maximum of 10 variables selected for each custom view.
To create/modify the custom views, perform the following.

1. On **Device Home** page, tap **My Views**.
2. Tap Configure and tap Select.

The Configure My Views dialog box appears.

3. To customize **View1** and **View2**, select the variables by checking the box against desired variables.
4. Tap or to navigate to previous and next set of variables.
5. Once done, tap **Options** to select **Save My Views**.

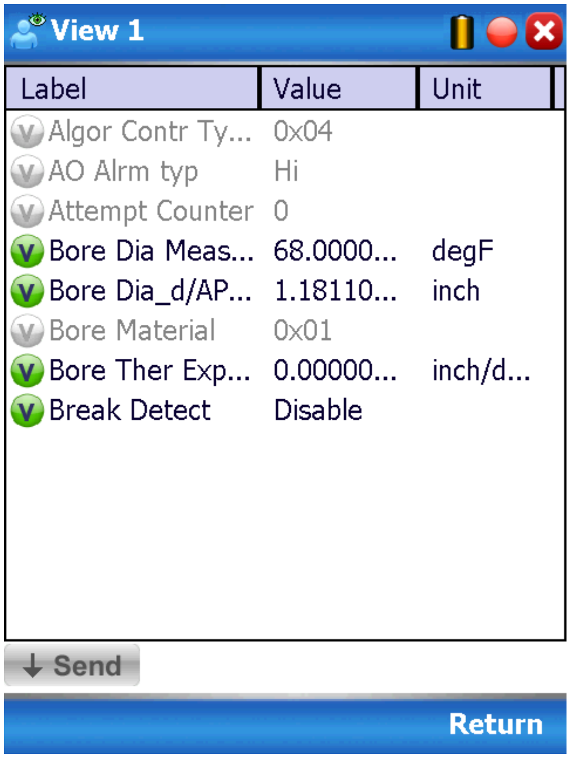
Two custom views are ready with selected variables.
Note: Since a custom view can contain only up to 10 variables each, a warning is displayed if you have selected more than 10 variables.
To rename the views, perform the following.

6. Tap **Options** > **Rename View1**.

A dialog box appears informing you to enter the name.

7. Tap **Ok**.
8. Tap Option>Save to persist the change
9. Tap **Return** to return to My Views page. You would see two options with the names you gave to the newly created views.

Note: To view the custom views, tap **My View 1** > **Select**.
The My View 1 page appears.



Edit the parameters that are Read / Write and select Send.

For more details on any of the FDC features, refer the "*MC Tookit User Manual*, document # 34-ST-25-50 (MCT404)."

6.2.21 Offline Configuration

6.2.21.1 Overview

Offline Configuration refers to configuring a device when the device is not physically present or communicating with the application. This process enables you to create and save a configuration for a device, even when the device is not there physically. Later when the device becomes available with live communication, the same configuration can be downloaded to the device. This feature enables you to save on device commissioning time and even helps you to replicate the configuration in multiplicity of devices with lesser efforts. Currently, FDC does not support creating offline configuration. However, it supports importing of offline configuration from FDM R310 or later versions. The configurations thus imported can be downloaded to the device from FDC.
The following are the tasks that you need to perform for importing offline configuration in FDC application software and then downloading it to the device.

- Create offline configuration template in FDM
- Save the configuration in FDM in FDM format.
- Import the offline configuration in FDC
- Download the offline configuration to the device

Note: For details on creating and using offline configuration, refer to section Offline configuration in FDM User's Guide.

6.2.21.2 Importing offline configuration

Using this feature you can import offline configuration template. The offline configuration template has to be created in FDM and saved in FDM format. Copy the .fdm files into the storage location of the FDC.

To import an offline configuration, perform the following steps.

1. On the FDC homepage, tap Offline Configuration > Select.

The **Offline Configurations** page appears.

2. Tap **Options** > **Import**.

The **Select a File** dialog box appears.

3. Navigate to the location where the offline configuration template is stored.
4. Select the required offline configuration template from the list.
5. Double-tap and the offline configuration template is imported.

A success message appears.

Note: In case if the offline configuration template is already imported, an overwrite message appears.

6. Tap **OK** to return to the **Offline Configurations** page. The device details appear on the bottom of the page.

6.2.21.3 Deleting offline configuration

Using this feature you can delete an offline configuration template.
To delete an offline configuration, perform the following steps.

1. On the FDC homepage, tap Offline Configuration > Select.

The **Offline Configurations** page appears.

2. Select the required offline configuration template from the list.
3. Tap **Options** > **Delete**. A warning message appears.
4. Tap **Yes** to delete the offline configuration template.

6.2.21.4 Downloading an offline configuration

Using this feature, you can download the offline configuration when the device is online.
To download an offline configuration, perform the following steps.

1. On the FDC homepage, tap **Offline Configuration > Select**.

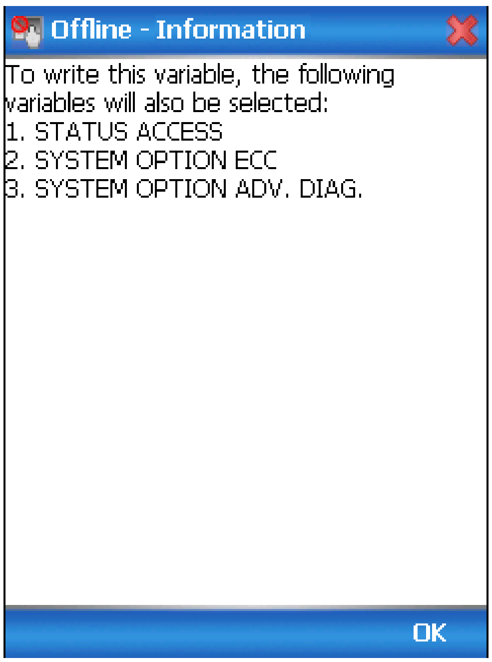
The **Offline Configurations** page appears.

2. Select the required offline configuration template from the list.
3. Tap **Options** > **Download**.

The **Offline – Select Variables** page appears with the all the variables.

Note: By default, all the variables selected in FDM will appear as selected and non-editable variables appear in grey color.

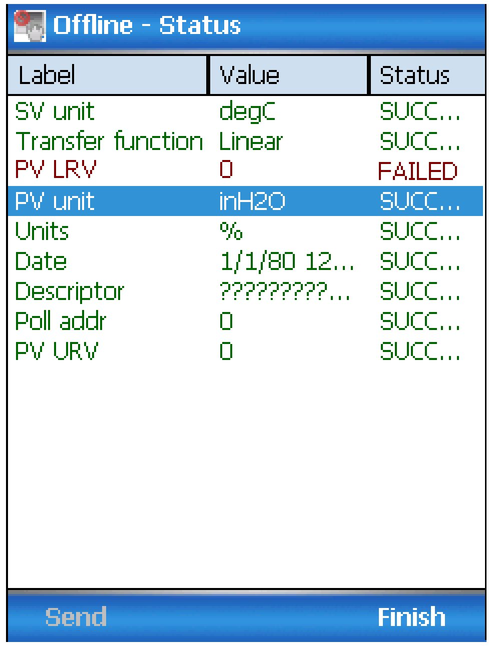
4. Select the required variable. In case you select a dependent variable, then variables on which it is dependent on will also be selected and the following warning appears.



5. Tap **OK** to return to the offline wizard.
6. Tap **Next**.

The **Offline – Review and Send** page appears with the list of selected variables.

7. Tap **Send** and the process to send the variables to the device starts. Once the downloading is complete, the following page appears.



Note: If the variables are downloaded successfully, status appears as **SUCCESS** in green color; and if failed, status appears as **FAILED** in red color.

8. Tap **Finish** to return to **FDC Homepage**.

This page has been intentionally left blank

7 DE Calibration

7.1 Overview

The SMV 800 SmartLine Transmitter does not require periodic calibration to maintain accuracy. Typically, calibration of a process-connected Transmitter may degrade, rather than augment its capability. For this reason, it is recommended that a Transmitter be removed from service before calibration. Moreover, calibration will be accomplished in a controlled, laboratory-type environment, using certified precision equipment.

7.2 Calibration Recommendations

If the Transmitter is digitally integrated with a Honeywell Total Plant Solution (TPS) system, you can initiate range calibration and associated reset functions through displays at the Universal Station, Global User Station (GUS), and Allen-Bradley Programmable Logic Controllers (PLCs). However, a range calibration using the SCT3000 application with the Transmitter removed from service is recommended. Refer to SCT3000 Smartline Configuration Tool Guide.

Calibration with the Transmitter removed from service needs to be accomplished in a controlled environment. Details for performing a calibration reset through the Universal Station are provided in the *PM/APM SmartLine Transmitter Integration Manual*, PM12-410, which is part of the TDC 3000^{X} system book set.

7.3 Test Equipment Required for Calibration

Depending upon the type of calibration you choose, you may need any of the following test equipment to accurately calibrate the transmitter:

- Digital Voltmeter or millimeter with 0.01% accuracy or better
- Honeywell Configuration Tools: Use the **SCT3000** application to calibrate the SMV 800 DE model..
- Calibration-standard input source with a 0.01% accuracy
- 250 ohm resistor with 0.01% tolerance or better.

7.4 DE Output Calibration

7.4.1 Output Calibration Preparation

This procedure applies to DE Transmitters operating in analog (current) mode only. First, verify the integrity of the electrical components in the output current loop. Make the connections shown in Figure 18, and establish communication with the Transmitter.
Connect the SCT3000 as indicated, and establish communication with the transmitter.

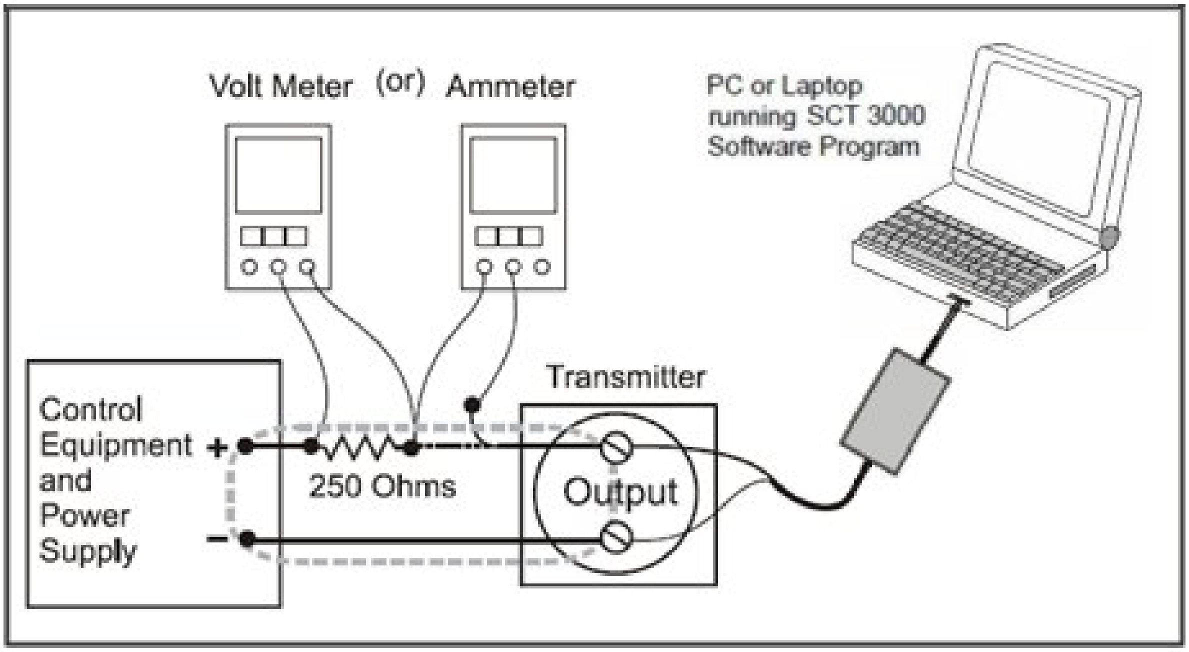


Figure 18 – Output Calibration Test Connections

The purpose of Analog output calibration is to verify the integrity of electrical components in the output current loop. For Output calibration, establish the test set up shown in Figure 18. Values of components in the current loop are not critical if they support reliable communication between the Transmitter and the Toolkit.

For a DE Transmitter operating in analog mode, calibrate the analog output current to the Process Variable (PV) input range such that 4 mA corresponds to the LRV of 0% and 20 mA corresponds to the URV of 100%. Figure 19 shows the PV scale and representative process system connections.

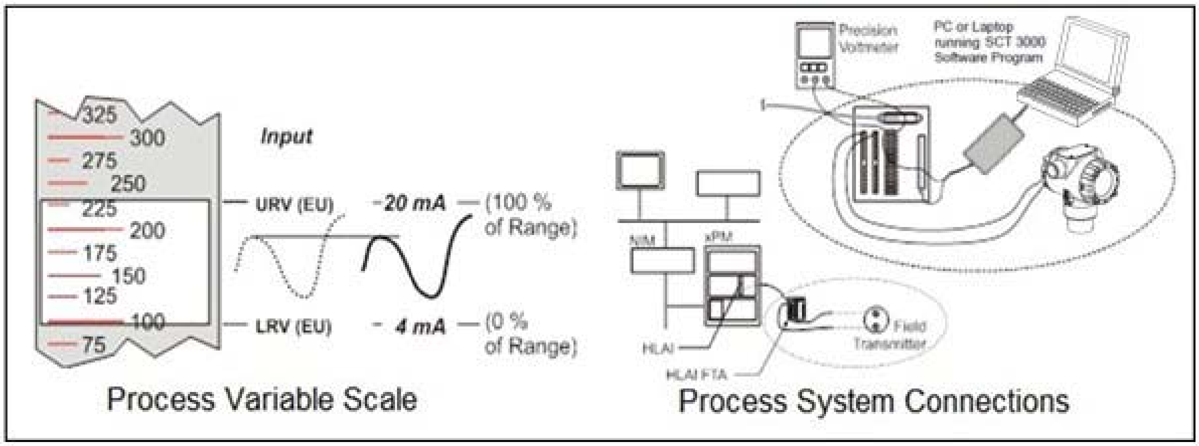
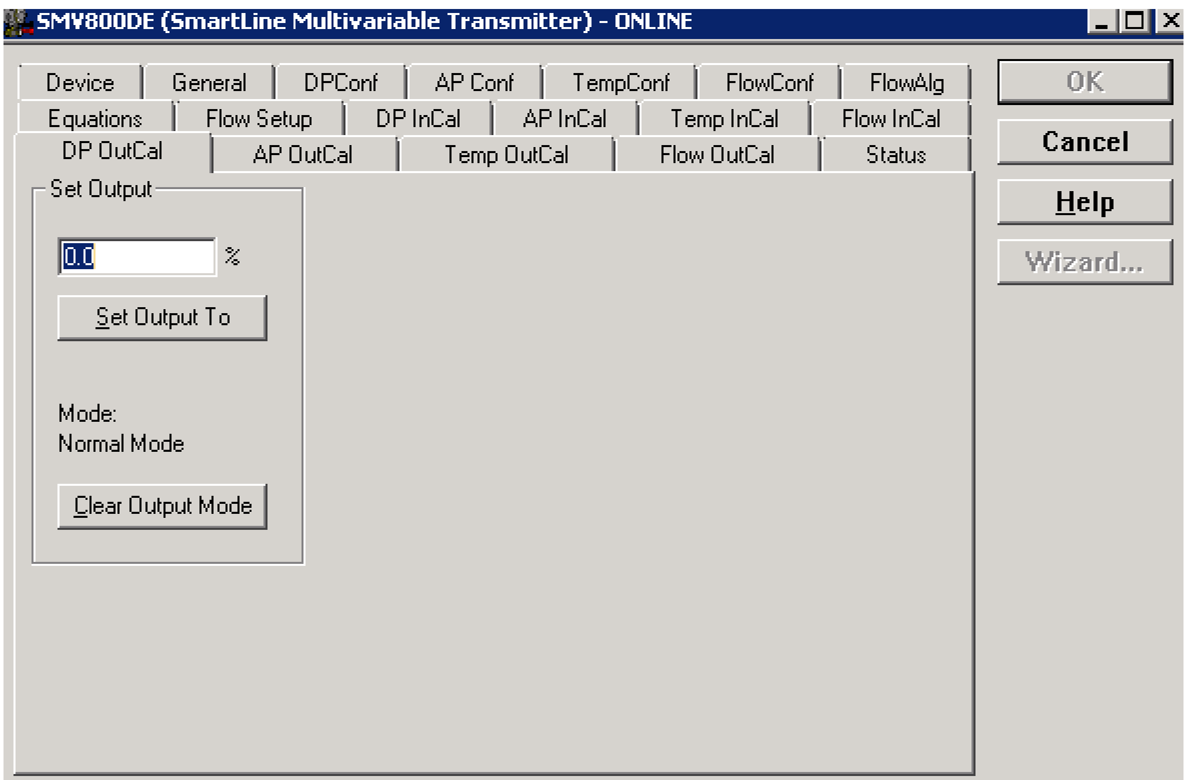


Figure 19 – DE Analog Mode Scaling and Test Connections

1. Start the SCT3000 application such that the DE MAIN MENU is displayed.
2. Select the **Output Calibration** tab for DP OutCal, AP OutCal, Temp Outcal or Flow OutCal.



3. Trim output current as follows:

a. Select **Set Output To 0%** or **100%**. You will be prompted to confirm that you want to place the Transmitter in output mode.

b. Verify that the loop is in manual control. In output mode, output current is fixed at the 0% or 100% level as selected in the TRIM DAC CURRENT box in the previous step.

c. Select **Yes**, and observe the loop current level. A meter reading of 4 mA corresponds to 1 volt as measured across the precision 250 ohm loop resistor.

d. Use the Toolkit to adjust the loop current to the Zero Percent level (4mA). If the current is low, tap the **Increment** button; if the current is high, tap the **Decrement** button. Note that the value on the meter changes accordingly. If the error is large, accelerate the adjustment rate by changing the Step Size to 10 or 100.

e. After establishing the zero current level (4 mA), select **Set Output To 100%**. A meter reading of 20 mA corresponds to 5 volts as measured across the precision 250 ohm resistor.

f. Use the **Increment** or **Decrement** button, as necessary to adjust the output current to 20 mA. When the current reaches the 20 mA level, select **Clear Output**; the button will change to half-intensity.

4. Change the display in output mode as follows:
   a. Selecting the **Back** button before selecting the **Clear Output** button, you will be prompted to confirm that you want to clear the output.
   b. If you want to stay in output mode while viewing other displays, select **Yes**; otherwise, select **No** and the **Clear Output** button.

7.5 Calibrating Range Using a Configuration Tool

The range calibration involves two procedures, one to calibrate the input, the other to calibrate the output. This section provides both procedures.

7.5.2 Conditions for Input Calibration

Calibrate Transmitter input only when necessary, and under conditions that will ensure accuracy:

- Take Transmitter out of service, and move it to an area with favorable environmental conditions, for example, clean, dry, and temperature-controlled
- The source for the input Temperature must be precise, and certified for correct operation.
- Qualified personnel are required for the input calibration procedure.

To optimize accuracy, the PROM includes storage for calibration constants: Correct LRV, and Correct URV. These constants provide for optimum accuracy in that they enable fine-tuning of the input calculations by first correcting at zero input, then by bounding the input calculations at the selected operating range. Corrections are applied at the Lower Range Value (LRV) and the Upper Range Value (URV).

Factory calibration can be specified when you order your Transmitter. Also, if precision equipment, suitable environment, and required skill are available at your site, input calibration can be done locally.

The procedure needs a precision Temperature source with an accuracy of 0.04% or better to do a range calibration. Factory calibration of the SMV 800 Transmitter is accomplished with inches-of-water ranges referenced to a temperature of 39.2 °F (4°C).

7.5.3 Input Calibration Procedures Description

The input calibration process consists of the following three parts:

- Correcting the input LRV.
- Correcting the input URV.

For the input calibration procedure, current loop component tolerances and values are not critical if they support reliable communication between the Transmitter and the SCT3000, refer to the SMV 800 SmartLine Multivariable Transmitter User's Manual, 34-SM-25-03.

For the input calibration procedures, connect the test setup illustrated in Figure 20. Either voltage mode (Voltmeter across the resistor) or current mode (Ammeter in series with the resistor) is satisfactory.

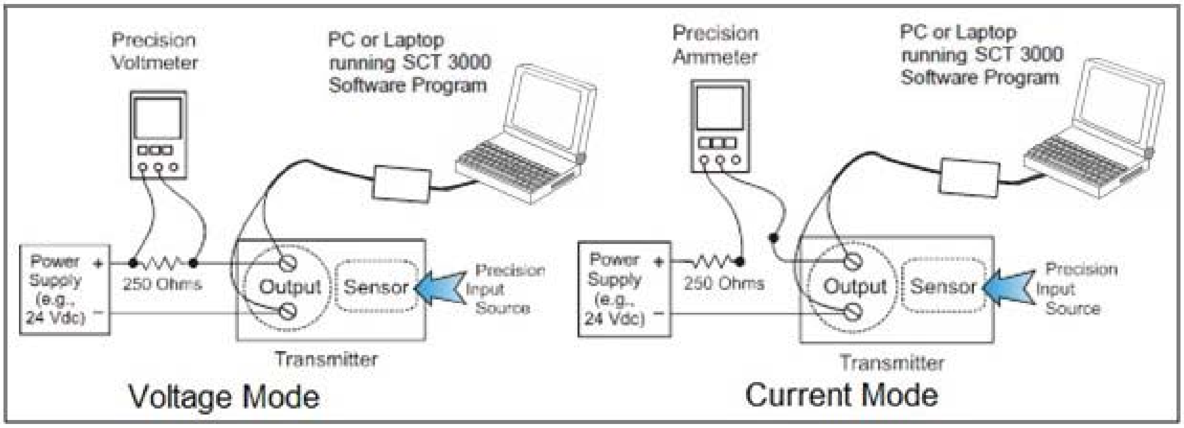


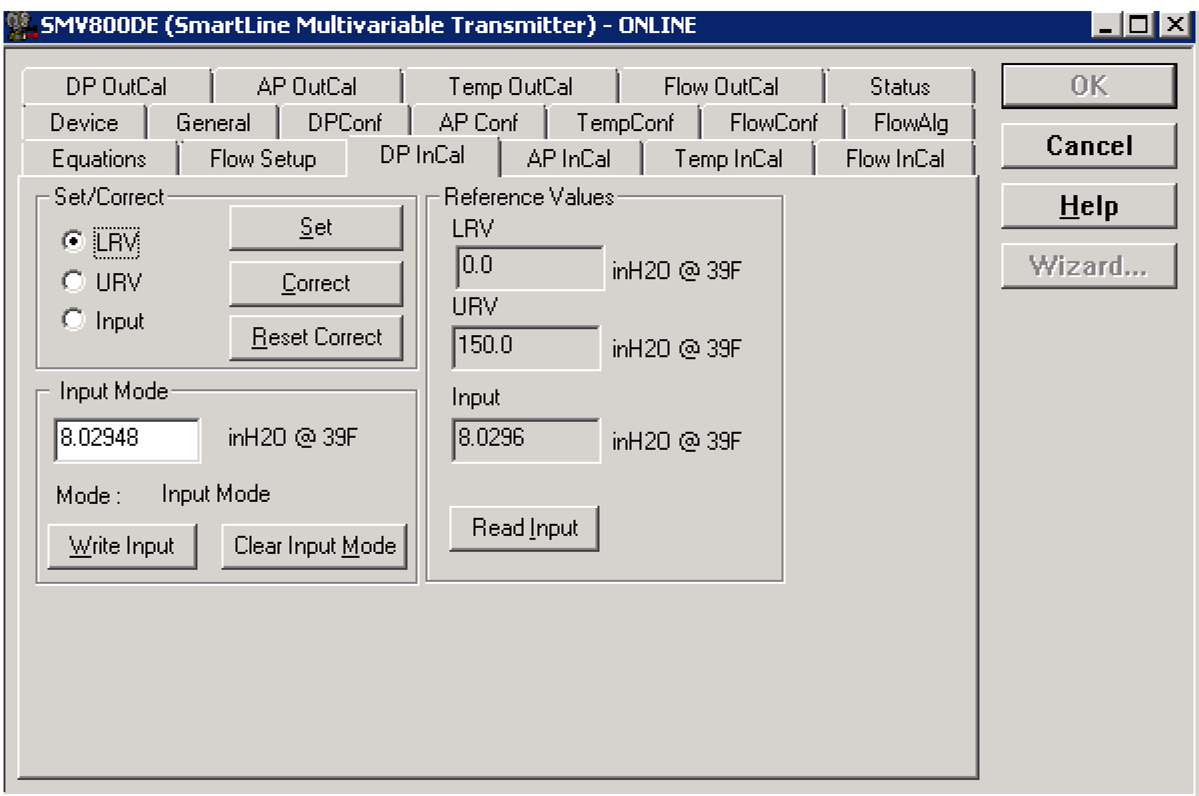
Figure 20 – Input Calibration Connections

7.6 DE Input Calibration Procedure

Start the SCT3000 application such that the DE MAIN MENU is displayed.
Select the Input Calibration tab for DP InCal, AP InCal, Temp Incal or Flow InCal.

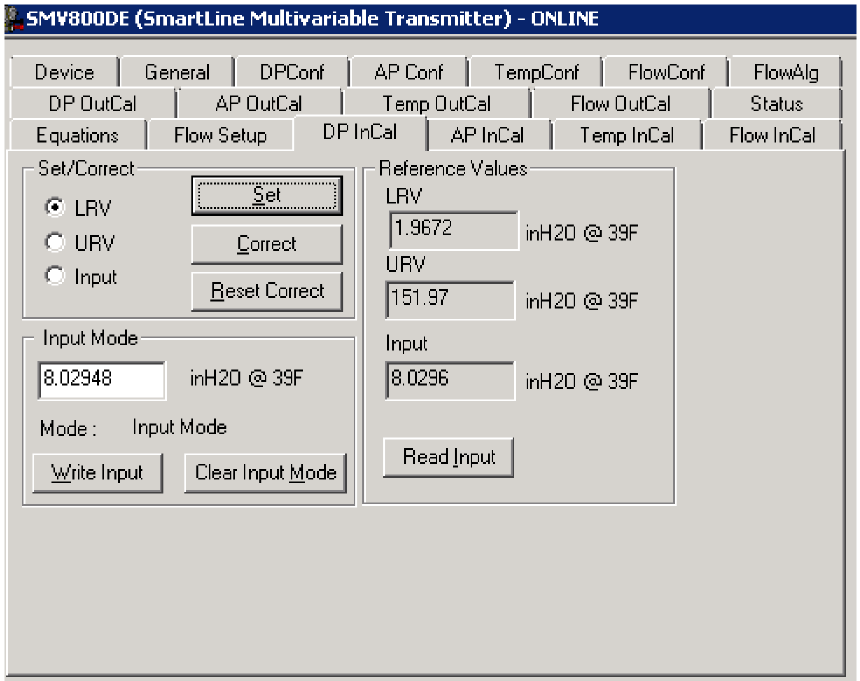
7.6.4 DP Input Cal

Select the Input Calibration tab for DP InCal.

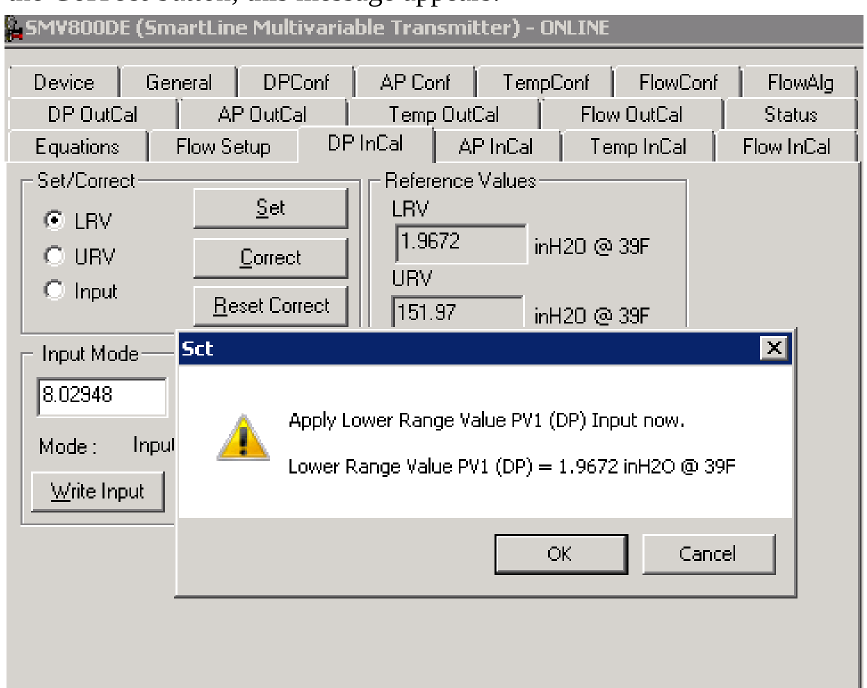


7.6.5 Correct DP Input at the Lower Range Value (LRV)

1. After the LRV and URV have been entered, select the **Correct LRV** button on the CALIBRATION display. (See Step 4 in the previous procedure to bring the CALIBRATION screen to the display.)
2. Select the **LRV** button. This message appears:

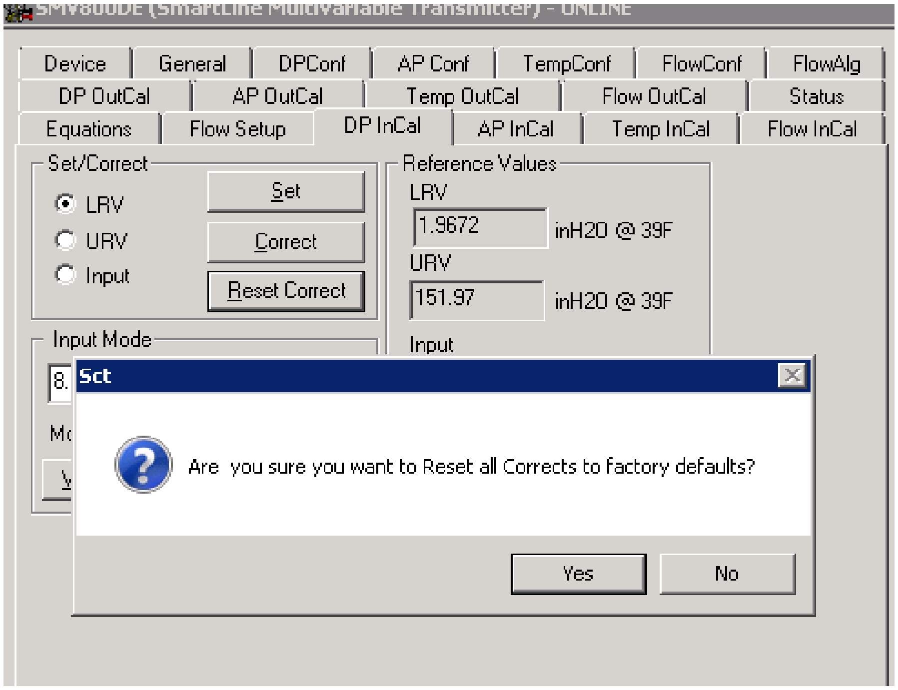


3. Adjust the PV input Temperature to the ***exact value of the LRV*** entered in the DE CONFIGURE display.
4. Select the **Correct** button; this message appears:



5. Observe the input pressure at the applied value; when it is stable, select the **OK** button.

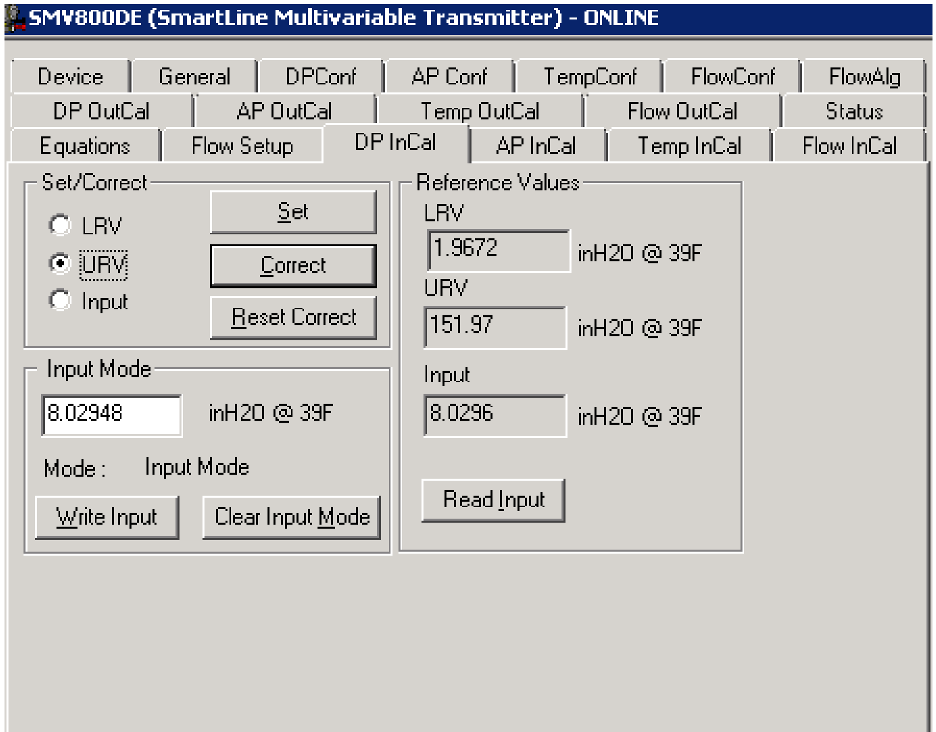
6. When the Transmitter has completed the LRV correction, this message appears:



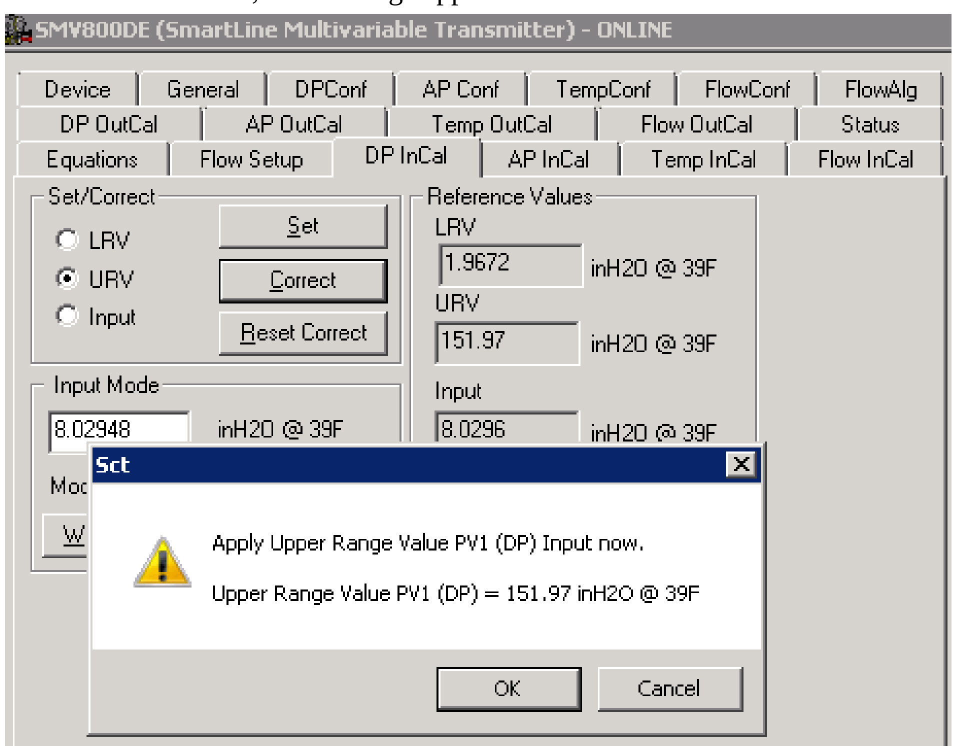
7. Select **Yes** to acknowledge.

7.6.6 Correct DP Input at URV

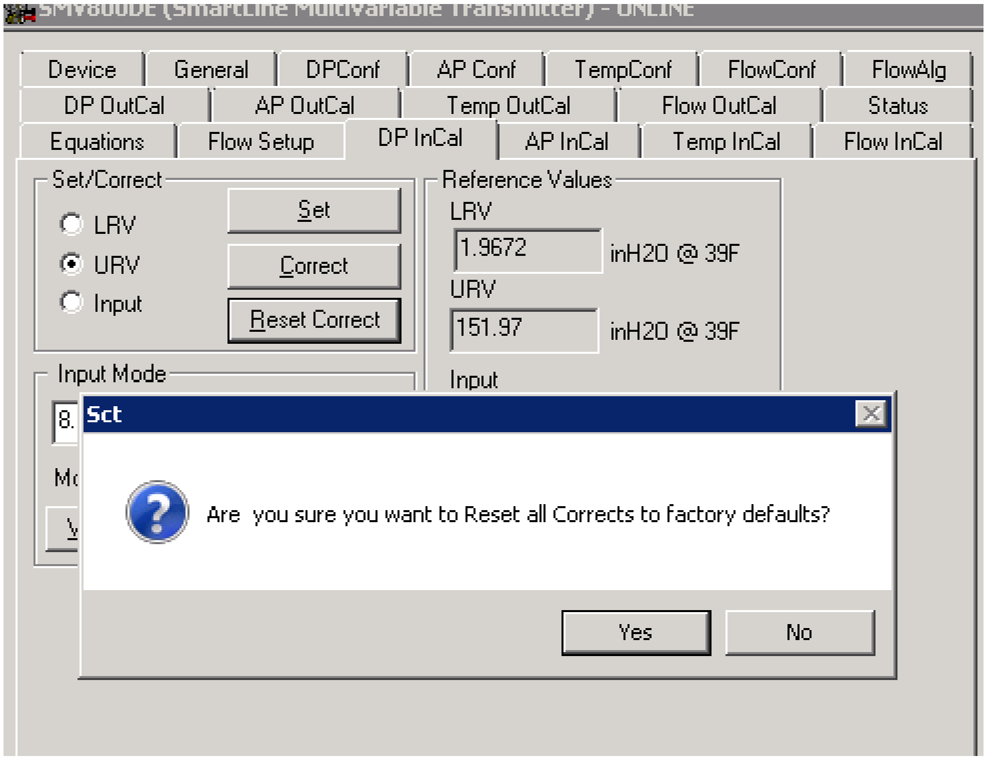
1. Select the **URV** button. This message appears.



2. Adjust the PV input pressure to **the *exact value of the URV*** entered in the DE CONFIGURE display.
3. Select the **Correct** button; this message appears:



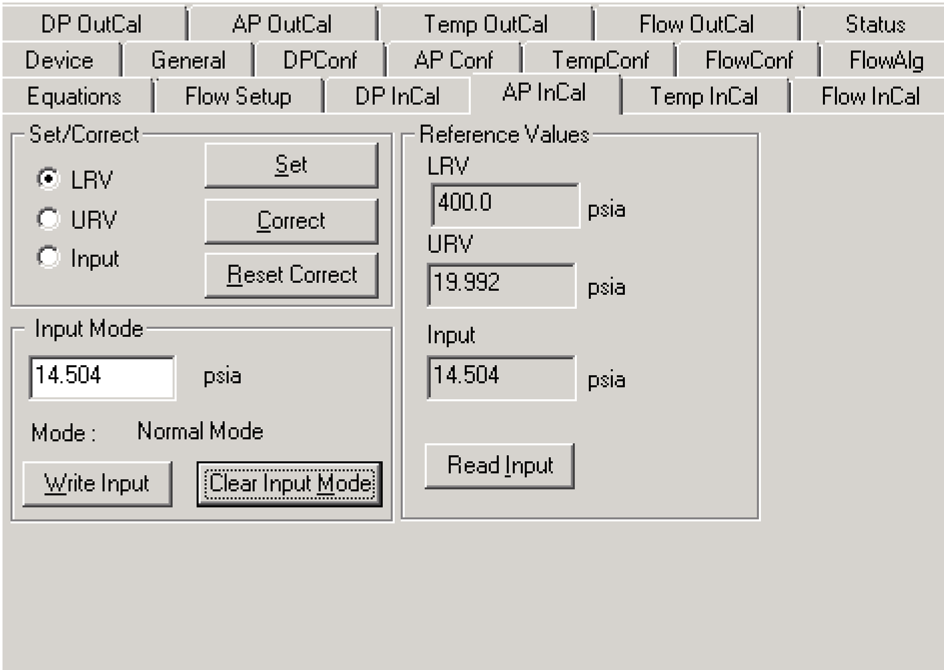
3. Select the **OK** button.
4. When the transmitter has completed the URV correction, this message appears.



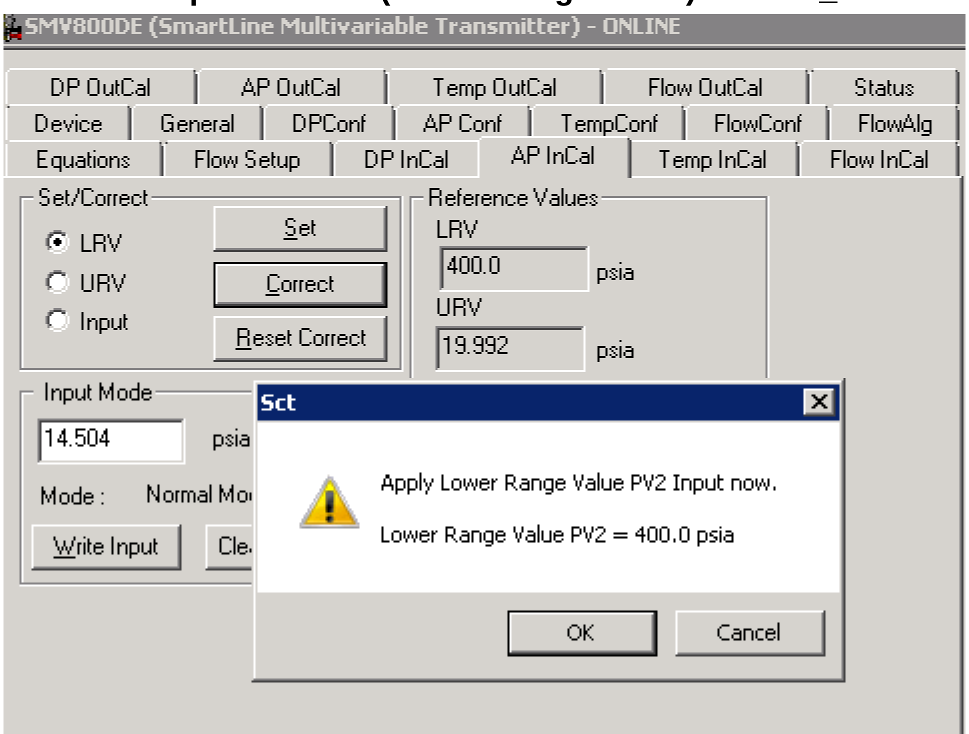
5. Select **Yes** to acknowledge.

7.6.7 AP Input Calibaration

Select tab AP InCal

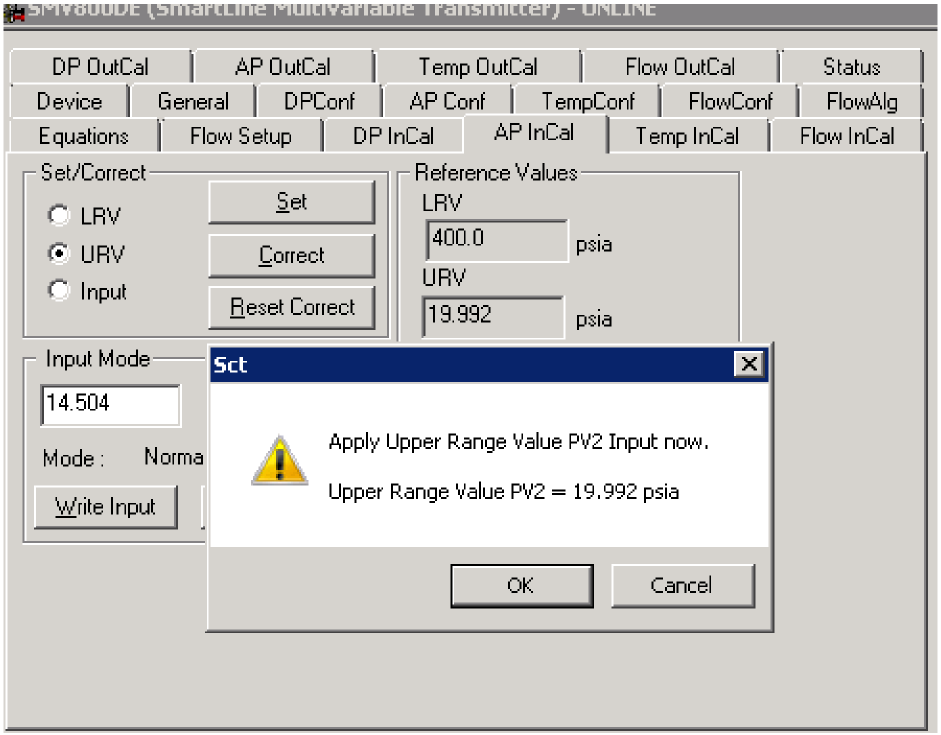


7.6.8 AP Input Cal LRV (Lower Range Value) Correct_



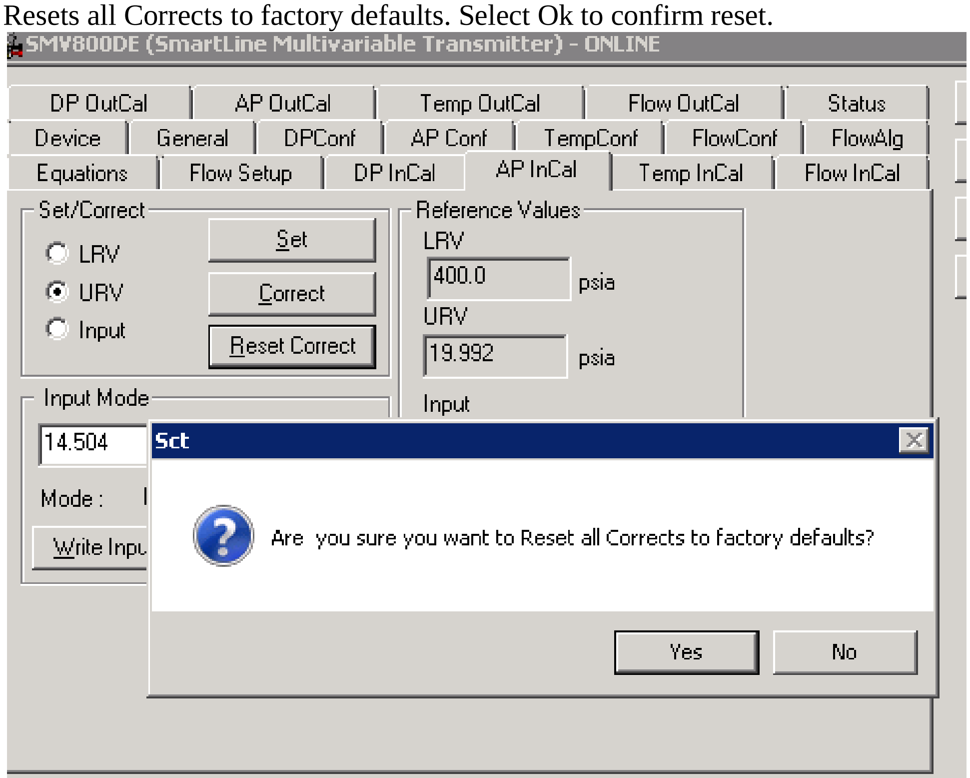
7.6.9 AP Input Cal URV (Upper Range Value) Correct

screens will show URV.



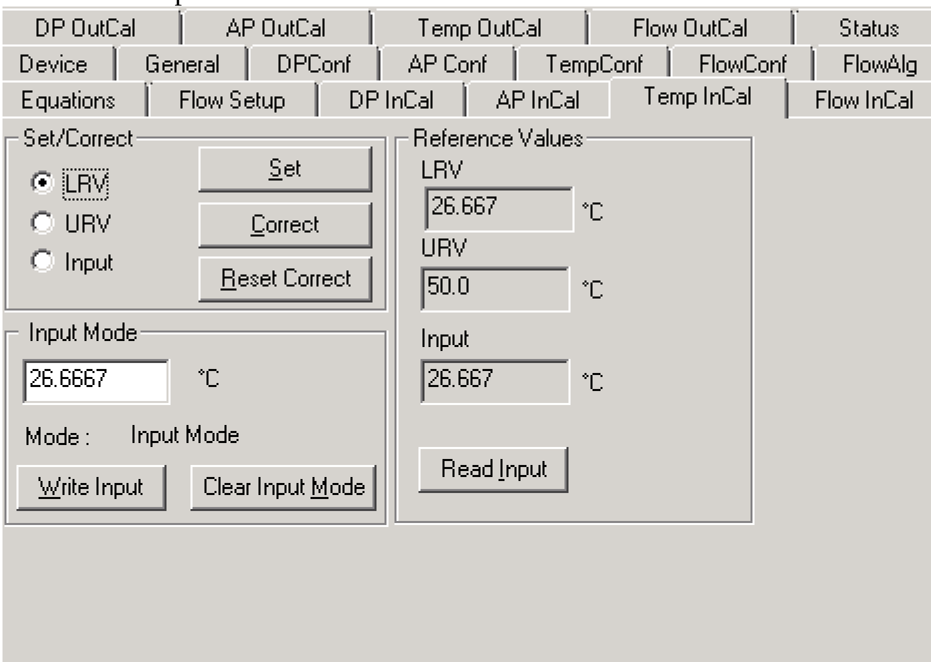
7.6.10 Reset Corrects

Resets all Corrects to factory defaults. Select Ok to confirm reset.

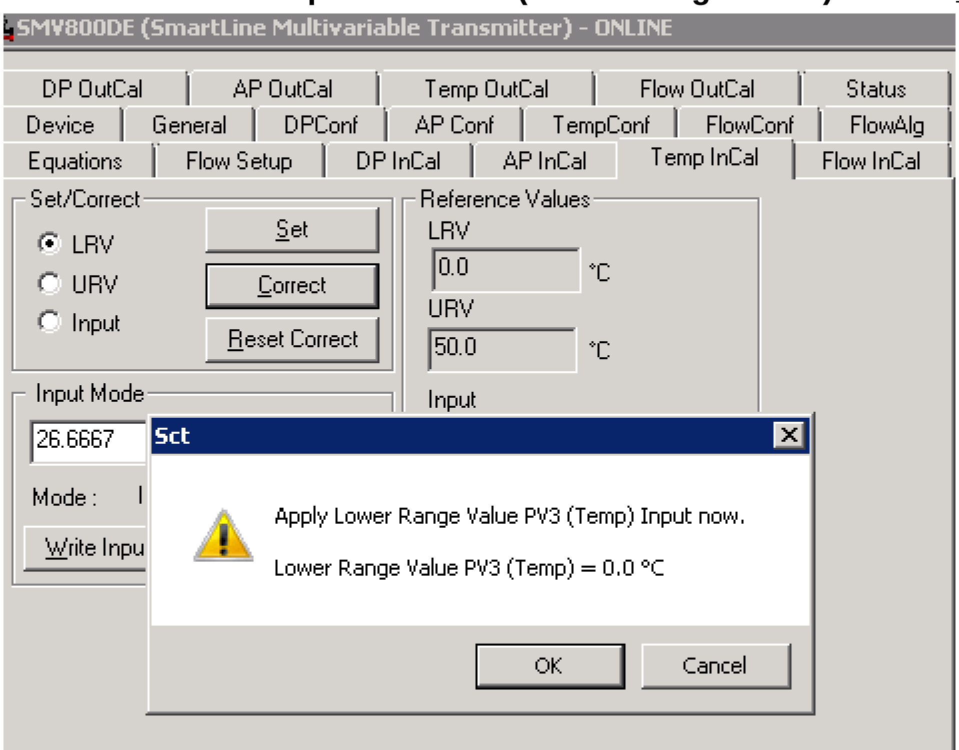


7.6.11 Temperature Input Calibaration

Select tab Temp InCal

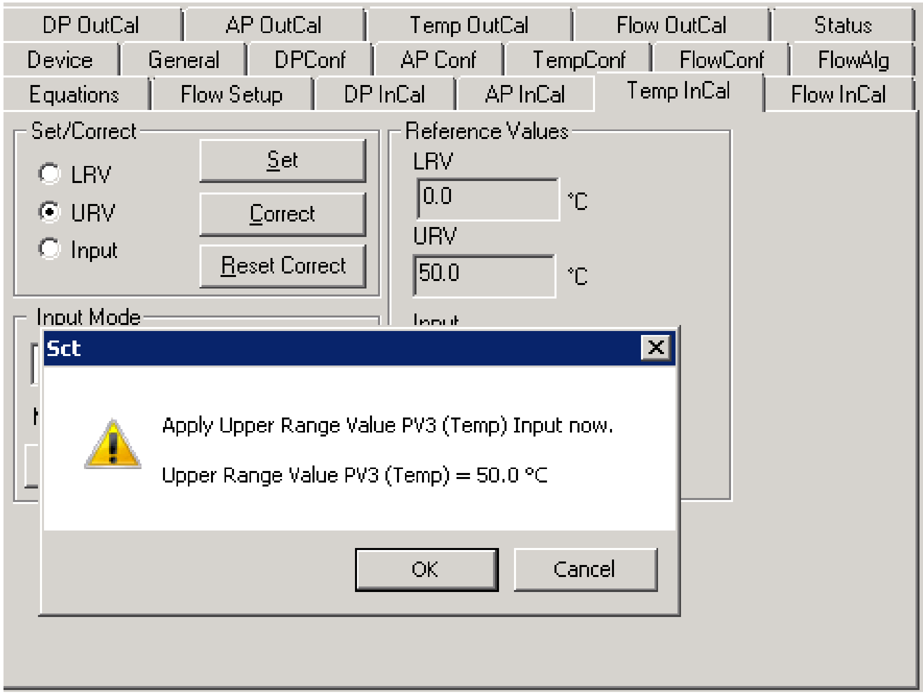


7.6.12 Process Temperature LRV (Lower Range Value) Correct_



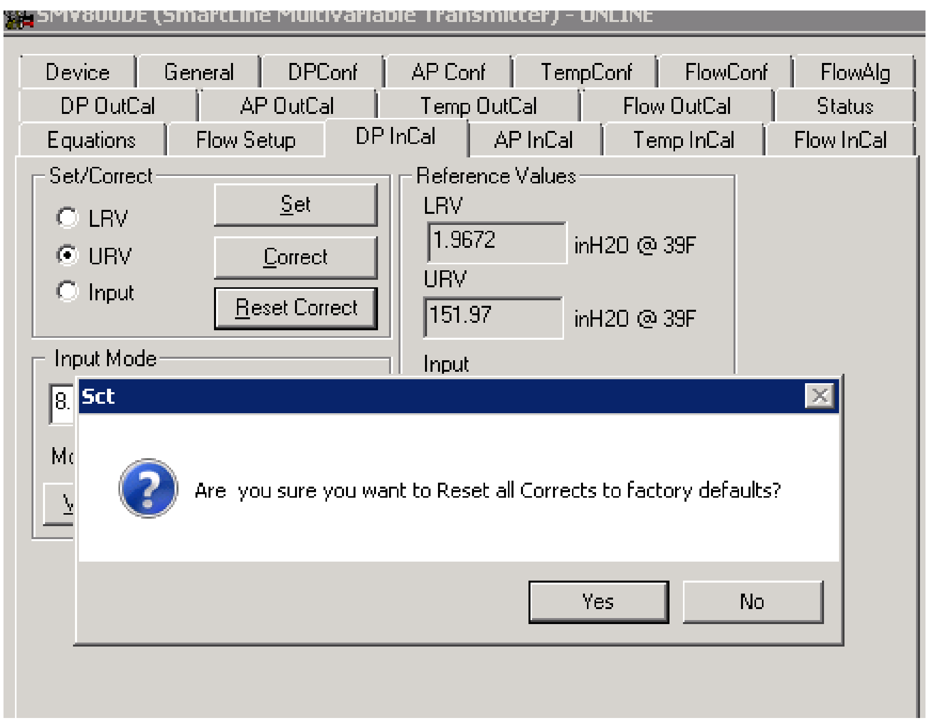
7.6.13 Process Temperature URV (Upper Range Value) Correct

screens will show URV.



7.6.14 Reset Corrects

Resets all Corrects to factory defaults. Select Ok to confirm reset.



8 HART Calibration

8.1 About This Section

This section provides information about calibrating a Transmitter's analog output and measurement range. It also covers the procedure to reset calibration to the default values as a quick alternative to measurement range calibration.

This section includes the following topics:

- How to calibrate a Transmitter's analog output circuit using the Communicator
- How to perform a two-point calibration of a Transmitter
- How to perform a correct reset to return a Transmitter calibration to its default values.

8.1.1 About Calibration

The SMV 800 SmartLine Transmitter does not require calibration at periodic intervals to maintain accuracy. If a recalibration is required, we recommend that perform a bench calibration with the Transmitter removed from the process and located in a controlled environment to get the best accuracy.

Before you recalibrate a Transmitter's measurement range, you must calibrate its analog output signal. See section 8.2 for the procedure.

You can also use the FDC application to reset the calibration data to default values, if they are corrupted, until the Transmitter can be recalibrated. See Section 8.3.5 for details.

All procedures in this manual assume the Transmitter is configured for Loop Current Mode enabled).

8.1.2 Equipment Required

Depending on the selected calibration, you may need any of the following test equipment items to accurately calibrate the Transmitter:

- Digital Voltmeter or millimeter with 0.02% accuracy or better
- MCT404 Toolkit
- Calibration standard pressure source with a 0.02% accuracy
- 250 ohm resistor with 0.01% tolerance or better.

8.2 Analog Output Signal Calibration

With a Transmitter in its constant current source mode, its analog output circuit can be calibrated at its 0 (zero)% and 100% levels. It is not necessary to remove the Transmitter from service.

The following procedure is used for analog output signal calibration.

You can calculate milliamperes of current from a voltage measurement as follows:
Dc milliamps = 1000 X voltage/resistance

IMPORTANT: Be sure that the accuracy of the resistor is 0.01% or better for current measurements made by voltage drop.

1. Connect the MCT404 Toolkit across loop wiring, and turn it on. See Figure 21 for a sample test equipment hookup.
2. Launch the FDC application.
3. On the Home page, select Online and establish a connection with the device as follows;
4. Select the My Device menu, and choose from the following menus:
    a. Device setup \ Calibration \ Calibration Methods \ D/A trim
5. You will be prompted to remove the loop from automatic control; after removing the loop from automatic control, press OK.
6. When a prompt appears, connect a precision milliammeter or voltmeter (0.03% accuracy or better) in the loop to check readings, and press OK. The following prompts will be displayed:
    - Setting field device to output to 4mA. Press OK
    - Enter meter value. Key in the meter value, and press ENTER.
    - Field device output 4.000 mA equal to reference meter?
      1 Yes
      2 No

If the reference meter is not equal to the field device output then select No and press Enter
Key in the new meter value
Return back to the ”Enter Meter Value” prompt until the field device output equals the reference meter
Select Yes and press Enter

7. The following display prompts will appear:
    - Setting field device output to 20mA. Press OK
    - Enter meter value. Key in the meter value, and press ENTER.
    - Field device output 20.000 mA equal to reference meter?
    - 1 Yes
    - 2 No
        - If the reference meter is not equal to the field device output then select No and press Enter
        - Key in the new meter value
        - Return back to the ”Enter Meter Value” prompt until the field device output equals the reference meter
        - Select Yes and press Enter
8. The prompt notifies you that the field device will be returned to its original output

8.3 Calibrating Range

The SMV 800 Transmitter supports two-point calibration. This means that when two points in a range are calibrated, all points in that range adjust to the calibration.

The procedures in this section are used to calibrate a differential pressure (DP) Transmitter to a range of 0 to 200 inH_2O for example purposes. This procedure assumes that the Transmitter has been removed from the process and is located in a controlled environment.

IMPORTANT! You must have a precision pressure source with an accuracy of 0.02% or better to do a range calibration. Note that the factory calibrates SMV 800 Transmitters using inches of water pressure reference to a temperature of 39.2^{o}F (4^{o}C).

8.3.3 Correcting the Lower Range Value (LRV)

1. Connect a power supply and the MCT404 Toolkit to the signal terminals of the Transmitter's terminal block.
2. Connect the precision pressure source to the high pressure side of the DP-type Transmitter.
3. Turn on the power supply, and allow the Transmitter to become stable.
4. Turn the MCT404 Toolkit on, start the FDC application.
5. On the FDC Home page, select Online, and establish communication with the Transmitter.
6. Select the My Device menu, and choose from the following selections:
    a. Device Setup \ Calibration \ Calibration Methods \ LRV Correct
7. You will be prompted to remove the loop from automatic control. After removing the loop from automatic control, press OK.
8. When prompted, adjust the pressure source to apply pressure equal to the LRV (0%), and press OK.
9. When the pressure stabilizes, press OK.
10. When prompted, remove pressure.
11. On the next prompt – "Please enter current Calibration Time in 24 Hr Clock format (Hour field)", enter the hour portion of the calibration time in the 24 Hr format HH, for example "12," and press Enter.
12. On the next prompt – "Please enter current Calibration Time (Minute field)," enter the Minutes field MM (example 23), and press ENTER..
13. When prompted to return the loop to automatic control, press ENTER

8.3.4 Correcting the Upper Range Value (URV)

1. See Figure 21 for typical test connections. Connect the power supply and communicator to the signal terminals of the Transmitter terminal block.
2. Connect the precision pressure source to the high pressure side of the DP-type Transmitter.
3. Turn on the power supply, and allow the Transmitter to become stable.
4. Turn on the MCT404 Toolkit, and start the FDC application into operation.
5. On the FDC Home page, select Online, and establish communication with the Transmitter.
6. Select the My Device menu, and choose one of the following options:
    1. Device Setup \ Calibration \ Calibration Methods \ URV Correct
7. You will be prompted to remove the loop from automatic control. Press OK
8. When prompted, adjust the pressure source to apply pressure equal to the URV (100%), and press OK.
9. When pressure stabilizes, press OK.

10. When prompted, remove the pressure.
11. On the next prompt – “Please enter Calibration Date in MM/DD/YYYY format, for example “05/27/2009,” and press Enter.
12. On the next prompt – “Please enter current Calibration Time in 24 Hr Clock format (Hour field)”, enter the hour portion of the calibration time in the 24 Hr format HH, for example “12,” and press Enter.
13. On the next prompt – “Please enter current Calibration Time (Minute field),” enter the Minutes field MM (example 23), and press Enter.
14. When prompted, return the loop to automatic control, and press Enter.

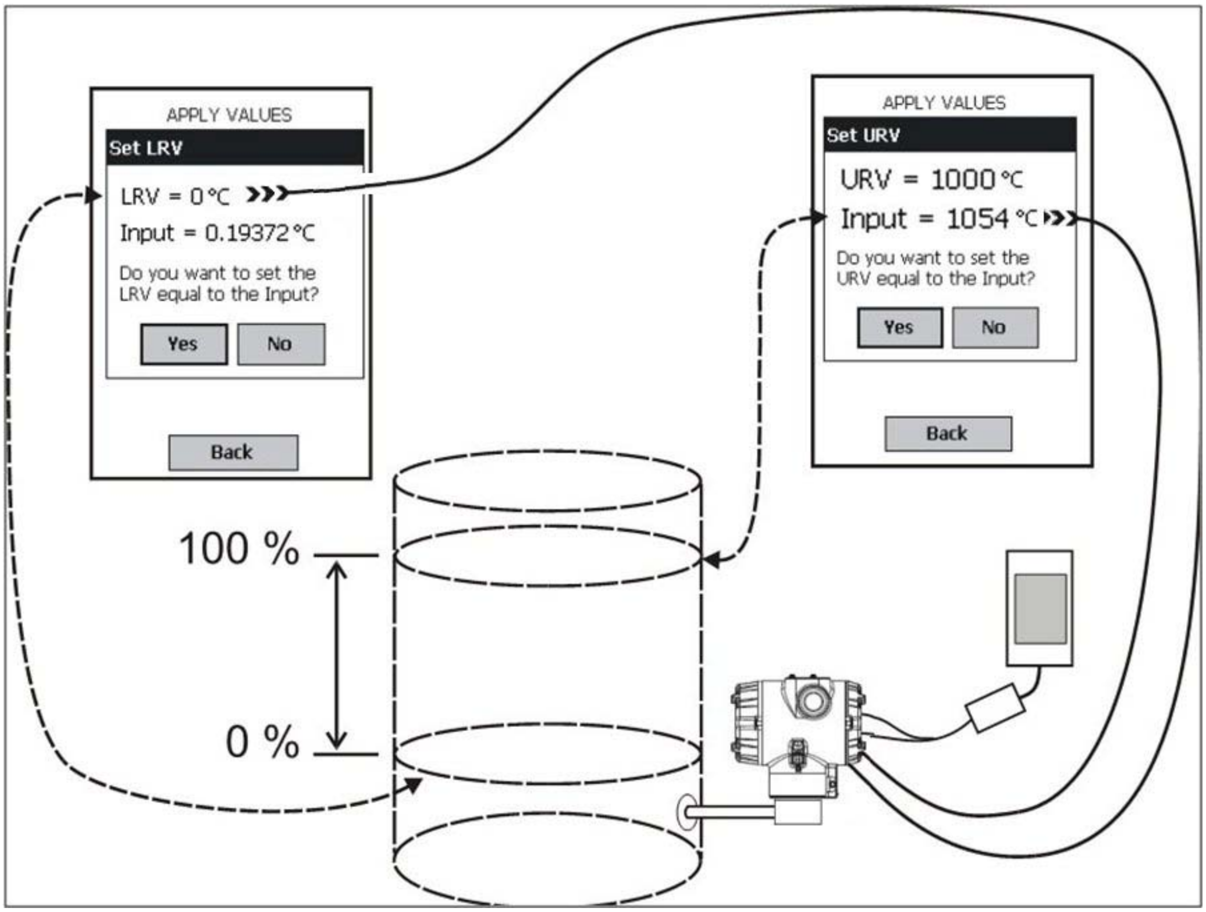


Figure 21 - Setup to manually set the PV LRV and URV

8.3.5 Resetting Calibration

SmartLine HART Transmitter can erase incorrect calibration data by resetting the device back to *final factory calibration*, which is performed per the ordered range. The Corrects Reset command returns the zero and span calibration factors to the original precise factory calibration.

The following procedure is used to reset calibration data to factory calibrated range using the communicator.

1. Connect the MCT404 Toolkit as per Figure 7 across the loop wiring and turn on.
2. Turn the MCT404 Toolkit on, start the FDC application.
3. On the FDC Home page, select Online, and establish communication with the Transmitter.
4. Select the My Device menu, and choose from the following selections:
    a. Device Setup \ Calibration \ Calibration Methods \ Reset Corrects
5. You will be prompted to remove the loop from automatic control. After removing the loopfrom automatic control, press OK.
6. You will be notified that a Reset Corrects is about to occur. Press OK
7. When the message “Reset Corrects OK” appears, press OK. The previous calibration “Corrects” are removed and calibration is reset to the factory values.
8. When prompted to return the loop to automatic control, press OK

8.3.6 Calibration Records

A history of the date and time of the last three Calibration procedures is available for the HART device. Run the Methods and follow the screen prompts to read the Calibration Records.

Select “My Device\Device Setup\Calibration” to select the following calibration records

- Correct URV Records
- Correct LRV Records
- Zero Trim Records
- Reset Corrects Records

Table 37 – Calibration Records

Note that Calibration Records are available for Differential Pressure, Static Pressure and Temperature.

Calibration Record	Description
Trim Records	
Curr Zero Trim	Date and Time of current zero trim field calibration displayed in mm/dd/yyyy format
Last Zero Trim	Date and Time of last zero trim field calibration displayed in mm/dd/yyyy format
Prev Zero Trim	Date and Time of previous zero trim field calibration displayed in mm/dd/yyyy format
Correct LRV Records	
Curr LRV Correct	Date and Time of current LRV correct done displayed in mm/dd/yyyy format
Last LRV Correct	Date and Time of last LRV correct done displayed in mm/dd/yyyy format
Prev LRV Correct	Date and Time of previous LRV correct done displayed in mm/dd/yyyy format
Correct URV Records	
Curr URV Correct	Date and Time of current URV correct done displayed in mm/dd/yyyy format
Last URV Correct	Date and Time of last UTV correct done displayed in mm/dd/yyyy format
Prev URV Correct	Date and Time of previous URV correct done displayed in mm/dd/yyyy format
Reset Correct Records	
Curr Corrects Rec	Date and Time of current Reset corrects done displayed in mm/dd/yyyy format
Last Corrects Rec	Date and Time of last Reset corrects done displayed in mm/dd/yyyy format
Prev Corrects Rec2	Date and Time of current Reset corrects done displayed in mm/dd/yyyy format

9 HART Advanced Diagnostics

9.1 About This Section

This section provides information about the Advanced Diagnostic features in the SMV 800 Transmitter.

9.2 Advanced Diagnostics

Table 38 – Viewing Advanced Diagnostics

What you want to view	What to do
• Install date • PV (Process Variable) Tracking Diagnostics • SV (Secondary Variable) Tracking Diagnostics • TV (Tertiary Variable) Tracking Diagnostics (DP transmitters only) • QV (Quarternary Temperature) tracking Diagnostics • Stress Life • Service Life • Operating Voltage Tracking Diagnostics • AVDD (Sensor Supply Voltage) Tracking Diagnostics • Sensor CPU Temp. Tracking • Power Up Diagnostics	Select Start/FDC to Launch the FDC application on the MCT404 Toolkit. On the Home page, select Online and establish connection with the device. Select My Device\Diagnostics\Adv Diagnostics.

9.2.1 Install Date

Install Date	Parameter	Description	Date of device installation. Date displayed in mm/dd/yyyy format where mm=month, dd=day, yyyy=year
		Set-up	User enters a date once during device lifetime. Once date is entered no further updates are possible and value becomes read only and is permanently saved.

9.2.2 PV Tracking Diagnostics

Table 39 – Maximum PV Tracking

UTL (Max PV Limit)	Parameter	Description	Upper Transducer Limit: PV (pressure) specified upper operating limit in user-selected units
		Set-up	None.
PV Upper Limit for Stress tracking	Method	Description for DP type	Actual limit value used to note “Time Above Limit” and “Time Since Last Event”. “PV Upper Stress Limit” value is equal to Upper Transducer Limit less 10% of Transducer limits range.
		Example for DP Type	For STD120 span is 0 to 400 inH_2O. Range is 400 inH_2O settable within LTL = -800 inH_2O to UTL = 800 inH_2O limits. “PV Upper Stress Limit” = 800 inH_2O - 160 inH_2O = 640 inH_2O.
		Example for AP and GP Types	For STA140 allowable working pressure is 0 to 500 psia. Withstand Pressure from LTL = 0 to UTL = 750 psia. “PV Upper Stress Limit” = 750 psia – 75 psia = 675 psia.
		Set-up	None – calculation is automatic.
Max PV	Parameter	Description	Maximum PV that the device has experienced in user selected units.
		Set-up	None. Value initialized to Min PV Limit value prior to leaving the factory. Updates to current PV automatically when powered at user site after one minute.
		NVM	Update after every 8 hours.
Time Above Upper Stress Limit	Parameter	Description	Accumulation of minutes that pressure measured by the device has been above “PV Upper Stress Limit”.
		Set-up	None – initialized to zero prior to leaving the factory.
		NVM	Backup once each 8 hour period
Time Since Last PV Up	Method	Description	Time that has passed since the last time device’s PV passed above “PV Upper Stress Limit” (in days, hours and minutes).
		Set-up	None – initialized to zero prior to leaving the factory.
		NVM	Backup once each 8 hour period

Table 40 – Minimum PV Tracking

LTL (Min PV Limit)	Parameter	Description	Lower Transducer Limit: PV(pressure) specified lower operating limit in user-selected units
		Set-up	None.
PV Lower Limit for Stress Condition	Method	Description	Actual limit value used in “Time Below Limit” and “Time Since Last Event”. Value is equal to “Min PV Limit” plus 10% of limits range for DP type devices and zero for GP and AP type devices.
		Example for DP Type	For STD120 span is 0 to 400 inH_2O. Range is 400 inH_2O settable within LTL = -800 inH_2O to UTL = 800 inH_2O limits. “PV Lower Stress Limit” = -800 inH_2O + 160 inH_2O = -640 inH_2O.
		Example for AP and GP Types	For STA140 allowable working pressure is 0 to 500 psia. Withstand Pressure from LTL = 0 to UTL = 750 psia. “PV Lower Stress Limit” = 0 psia.
		Set-up	None – calculation is automatic.
Min PV	Parameter	Description	Minimum PV that the device has experienced in user selected units.
		Set-up	None. Value initialized to Max PV Limit value prior to leaving the factory. Updates to current PV automatically when powered at user site after one minute.
		NVM	Update after every 8 hours
Time Below Lower Stress Limit	Parameter	Description	Accumulation of minutes that pressure measured by the device has been below the value of “PV Lower Stress Limit”.
		Set-up	None.
		NVM	Backup once each 8 hour period
Time Since Last PV Down	Method	Description	Time that has passed since the last time device’s PV passed below the value of “PV Lower Stress Limit” (in days, hours and minutes).
		Set-up	None – initialized to zero prior to leaving the factory.
		NVM	Backup once each 8 hour period

9.2.3 SV Tracking

Table 41 – Maximum SV Tracking

Max SV Limit	Parameter	Description	SV Temperature upper operating limit from specification.
		Set-up	None.
Max SV Value	Parameter	Description	Highest SV Temperature ever experienced by the device.
		Set-up	None - value initialized to Min SV Limit value prior to leaving the factory. Updates to current SV Temperature automatically when powered at user site after one minute.
		NVM	Update after every 8 hours.
Time Above Upper Stress Limit	Parameter	Description	Accumulation of minutes that device's SV Temperature has been above the value of "SV Upper Stress Limit".
		Set-up	None.
		NVM	Backup once each 8 hour period
Time Since Last SV Up	Method	Description	Time that has passed since the last time device's SV Temperature has passed above the value of "SV Upper Stress Limit" (in days, hours and minutes).
		Set-up	None.
		NVM	Backup once each 8 hour period

Table 42 – Minimum SV Tracking

Min SV Limit	Parameter	Description	SV Temperature lower operating limit from specification.
		Set-up	None.
Min SV Value	Parameter	Description	Lowest Meterbody Temperature ever experienced by the device.
		Set-up	None - value initialized to Max SV Limit value prior to leaving the factory. Updates to current SV Temperature automatically when powered at user site after one minute.
		NVM	Update after every 8 hours.
Time Below Lower Stress Limit	Parameter	Description	Accumulation of minutes that device's SV Temperature has been below the value of "SV Lower Stress Limit".
		Set-up	None.
		NVM	Backup once each 8 hour period
Time Since Last SV Down	Method	Description	Time that has passed since the last time device's SV Temperature has passed below the value of "SV Lower Stress Limit" (in days, hours, and minutes).
		Set-up	None.
		NVM	Backup once each 8 hour period

9.2.4 TV Tracking Diagnostics

Table 43 – TV Tracking Diagnostics

Max TV Limit	Parameter	Description	TV Pressure upper operating limit specification. Units are always PSI (pounds per square inch).
		Set-up	None.
Max TV Value	Parameter	Description	Highest TV pressure ever experienced by the device. Units are always PSI (pounds per square inch).
		Set-up	None.
		NVM	Backup once each 8 hour period
Time Above Upper Stress Limit	Parameter	Description	Accumulation of minutes that device's SP has been above the value of "TV pressure Upper Stress Limit".
		Set-up	None.
		NVM	Backup once each 8 hour period
Time Since Last TV Up	Method	Description	Time that has passed since the last time device's TV pressure has passed above the value of "TV pressure Upper Stress Limit" (in days, hours, and minutes).
		Set-up	None.
		NVM	Backup once each 8 hour period

9.2.5 ET Tracking Diagnostics

Table 44 – Maximum ET Diagnostics

Max ET Limit	Parameter	Description	Electronics Temperature (ET) upper operating limit from specification. Units are same degree units as has been selected for SV (Secondary Variable).
		Set-up	None.
ET Upper Limit for Stress Condition		Description	Actual limit used in "Time Above Limit" and "Time Since Last Event". Value is equal to "Max ET Limit" less 10% of limits range.
		Example	Electronics Temperature range is -40°F to 185°F for a total of 225°F. "ET Upper Stress Limit"= 185°F - 10% of 225°F = 162.5°F.
		Set-up	None – calculation is automatic.
Max ET Value	Parameter	Description	Highest Electronics Temperature ever experienced by the device. Units are same degree units as has been selected for SV (Secondary Variable).
		Set-up	None.
		NVM	Update every 8 hour.
Time Above Upper Stress Limit	Parameter	Description	Accumulation of minutes that device's Electronics Temperature has been above the value of "ET Upper Stress Limit".
		Set-up	None.
		NVM	Backup once each 8 hour period
Time Since Last ET Up	Method	Description	Time that has passed since the last time device's Electronics Temperature has passed above the value of "ET Upper Stress Limit" (in days, hours and minutes).
		Set-up	None.
		NVM	Backup once each 8 hour period

Table 45 – Minimum ET Diagnostics

Min ET Limit	Parameter	Description	Electronics Temperature (ET) lower operating limit from specification. Units are same degree units as has been selected for SV (Secondary Variable).
		Set-up	None.
ET Lower Limit for Stress Condition		Description	Actual limit used in "Time Below Limit" and "Time Since Last Event". Value is equal to "Min ET Limit" plus 10% of limits range.
		Example	Electronics Temperature range is -40°C to 85°C for a total of 125°C. "ET Lower Stress Limit" -40°C + 10% of 125°C = -27.5°C.
		Set-up	None – calculation is automatic.
Min ET Value	Parameter	Description	Lowest Electronics Temperature ever experienced by the device. Units are same degree units as has been selected for SV (Secondary Variable).
		Set-up	None.
		NVM	Update every 8 hour.

Time Below Lower Stress Limit	Parameter	Description	Accumulation of minutes that device's Electronics Temperature has been below the value of "ET Lower Stress Limit".
		Set-up	None.
		NVM	Backup once each 8 hour period
Time Since Last ET Down	Method	Description	Time that has passed since the last time device's Electronics Temperature has passed below the value of "ET Lower Stress Limit" (in days, hours, and minutes).
		Set-up	None.
		NVM	Backup once each 8 hour period

9.2.6 % Stress Life

% Stress Life	Parameter	Description	Percent of service life spent in stressful conditions. Indicates the % of service life where one or more of PV, static pressure, meter body temperature or electronics temperature are within 10% of respective range limits.
		Set-up	None.
		NVM	Backup once each 8 hour period

9.2.7 % Service Life

% Service Life	Parameter	Description	Percent of expected Service Life that device has been in service. Value is based on electronics temperature. Service life accumulates faster at higher temperatures with an exponential relationship.
		Set-up	None.
		NVM	Backup once each 8 hour period

9.2.8 Operating Voltage Diagnostics

Table 46 – Operating Voltage Diagnostics

Current Op Voltage	Parameter	Description	Operating voltage available at device terminals.
		Set-up	None – units always in volts.
		NVM	none
		Note **No accuracy is specified for this measurement!** **This value is intended to be used for informational purposes only and should not be used for control.**	
Min Op Voltage	Parameter	Description	Minimum operating voltage experienced by device at terminals since last reset of operating voltage parameters.
		Set-up	User can reset as desired using method described in item below.
		NVM	Backup once each 8 hour period
Time Since Last Voltage Low	Method	Description	Displays time since last minimum operating voltage event in minutes.
		Set-up	User can reset as desired using method described in item below.
		NVM	Update every 8 hour.
Reset Operating Voltage Parameters	Method	Description	Causes “Min Op Voltage” to be set to 32 volts and “Time Since Last Event” to be reset to zero. Within a short period of time “Min Op Voltage” will assume operating voltage value.
		Set-up	User actuates as desired.

9.2.9 AVDD Tracking Diagnostics

Table 47 – Maximum and Minimum AVDD Tracking

Max AVDD	Parameter	Description	Maximum Sensor Supply Voltage experienced by device since last reset of voltage parameters.
Time since last AVDD Up	Method	Description	Displays time since last Sensor Supply Voltage was above last Max AVDD
Min AVDD	Method	Description	Minimum Sensor Supply voltage experienced by device since last reset of voltage parameters.
Time since Last AVDD Down	Method	Description	Displays time since last Sensor Supply Voltage was below last Min AVDD

9.2.10 Sensor CPU Temperature Tracking Diagnostics

Table 48 – Maximum Sensor CPU Temperature Tracking

Max Sensor CPU Temp.	Parameter	Description	Maximum Sensor CPU Temperature experienced by device
		Set-up	none
Time Above Upper Stress Limit	Parameter	Description	Accumulation of minutes that Sensor CPU Temperature has been above the value of Max Sensor CPU Temp.
		Set-up	None.
		NVM	Backup once each 8 hour period
Time Since Last Sensor CPU Temp. Up	Method	Description	Time that has passed since the last time Sensor CPU Temp. has passed above the value of “Max Sensor CPU Temp” (in days, hours and minutes).
		Set-up	none
		NVM	Backup once each 8 hour period

Table 49 – Minimum Sensor CPU Temperature Tracking

Min Sensor CPU Temp.	Parameter	Description	Minimum Sensor CPU Temperature experienced by device
		Set-up	none
Time Below Upper Stress Limit	Parameter	Description	Accumulation of minutes that Sensor CPU Temperature has been below the value or Min Sensor CPU Temp.
		Set-up	none
		NVM	Backup once each 8 hour period
Time Since Last Sensor CPU Temp. Down	Method	Description	Time that has passed since the last time Sensor CPU Temperature has passed below the value of “Min Sensor CPU Temp” (in days, hours and minutes).
		Set-up	none
		NVM	Backup once each 8 hour period

9.2.11 Power Up Diagnostics

Table 50 – Power Up Diagnostics

Pwr fail counter	Parameter	Description	Total number of power-ups experienced by the unit.
		Set-up	None – initialized to zero prior to leaving factory.
		NVM	Backup once each 8 hour period
		Note	Only one power failure in each 8 hour period is counted.
Time since last power fail	Method	Description	Displays time since last power-up in minutes.
		Set-up	None.
		NVM	Backup once each 8 hour period–

10 Troubleshooting and Maintenance

10.1 HART Diagnostic Messages

Table 51 critical and non-critical HART diagnostic messages.

Table 51 – HART Critical Diagnostic Messages

Critical Diagnostics	
HART DD/DTM Tools	**Display**
• Sensor Critical Fault	• Meter Body and/or • Meter Body Comm and/or • Temp Sense Board and/or • Temp Input and/or • Temp Sensor Comm
• SIL Diag Failure or • msp vcc fault and/or • Config Data Corrupt • DAC Failure	• Comm Module
• DAC Failure	• Comm Module Temp
• msp vcc fault	• msp vcc fault

Table 52 – HART Non-Critical Diagnostic Messages

Non-critical Diagnostics	
HART DD/DTM Tools	**Display**
• Local Display	• Display Setup
• Fixed Current Mode	• Analog Out Mode
• Comm Sec NC Fault	N/A
• Sensing Sec NC Fault	• Temp cal Correct • DP Zero Correct and/or • DP Span Correct and/or • Meter Body Input
• Sensor Over Temperature	• Temp Module Temp and/or • Meter Body Temp
• PV Out Of Range	• PV Out Of Range
• No Fact Calib	• Pressure Fac Cal and/or • Temp Fac Cal
• No DAC Compensation	• DAC Temp Comp
• N/A	• Temp Cal Correct
• LRV Set Err. Zero Config Button	N/A
• URV Set Err. Span Config Button	N/A
• CJ Out of Limit	• CJ Range
• AO Out of Range	N/A
• Sensor Input Open	• Temp Input and/or • Temp Input TB6
• Loop Current Noise	N/A

• Sensor Unreliable Comm	• Meter Body Comm and/or • Temp Comm
• Tamper Alarm	N/A
• No DAC Calibration	N/A
• Low Supply Voltage	• Supply Voltage
• Flow Calculation Details	• Flow Divide by 0 and/or • Flow Sqrt of Neg and/or • Flow Direction and/or • Flow SP/PT Comp
• DP/SP/PT/FLOW Simulation Mode	• DP Simulation and/or • SP Simulation and/or • PT Simulation and/or • Flow Simulation
• Sensor health Warning	N/A
• Sensor In Low Power Mode	N/A

10.2 HART Diagnostic Details

Table 52 and Table 53 lists and describes the HART critical and non-critical HART diagnostic details.

Table 53 – HART Critical Details

HART DD/DTM Tools	Display Status	Details/Resolutions
Sensor Critical Failure	Meter Body and/or Meter Body Comm and/or Temp Sense Board and/or Temp Input and/or Temp Sensor Comm	Possible causes: • Critical failure reported at the Sensor level • Meter Body NVM Corrupt Resolution: Reset the device. If the problem persists, replace the Meter Body.
SIL Diag Failure or msp vcc fault and/or Config Data Corrupt DAC Failure	Comm Module	Possible causes: • Critical failure reported for the Communications Module • Database Corruption • Communication section has failed Resolution: Reset the device. If the problem persists, replace the Communications Module.
DAC Failure	Comm Module Temp	Possible causes: • No response from the Sensor Resolution: Try replacing the Communications module. If this does not fix the problem, replace the Meter Body.
msp vcc fault	msp vcc fault	Possible causes: The supply voltage of communication board is below the specification or above the specification. Resolution: Check the connection of Meter body & communication board. If problem persists then try replacing with the Terminal board module. If this does not fix the problem, replace the Transmitter

Table 54 - Non-Critical Diagnostic Details

HART DD/DTM Tools	Display Status	Details/Resolutions
Local Display	Display Setup	Possible causes: The Display has been disconnected or configuration data has been corrupted. Resolution: Secure Display connections and recheck. If problem persists, reset the device. If the problem still persists, replace the Display.
Fixed Current Mode	Analogue Out Mode	Possible causes: Output current is fixed and not varying with applied input. Loop current mode is disabled or Loop Test is active. Resolution: Enable Loop Current Mode if it is disabled or exit the Loop Test mode if active.
Sensing Sec NC Fault	Temp Cal Correct DP Zero Correct and/or DP Span Correct and/or Meter Body Input	Possible Causes: ZERO or SPAN correction factor is outside acceptable limits. INPUT may have been incorrect during calibration or transmitter was in output mode during a CORRECT procedure. Or meter body non critical fault occurred. Or Temperature sensor input is open. Resolution: Check input pressure and be sure that it matches calibrated range values (LRV and URV). Check Meter Body. Perform an LRV or ZERO CORRECT procedure followed by a URV CORRECT procedure.
Sensor Over Temperature	Temp Module Temp and/or Meter Body Temp	Possible causes: Meter Body temperature is too high. Accuracy and life span may decrease if it remains high. Resolution: Verify the environment temperature is within specification. Take steps to insulate Meter Body from temperature source.
PV Out of Range	PV Out of Range	Possible causes: • Sensor Overload/Sensor Fault • Redundant Characterization Calculation Error • Calculated pressure is above Upper Transducer Limit (UTL). Resolution: Check range and, if required, replace transmitter with one that has a wider range. Meter Body may have been damaged. Check the transmitter for accuracy and linearity. Replace Meter Body and recalibrate if needed.

No Factory Calibration	Pressure Fac Cal and/or Temp Fac Cal	Possible causes: Factory Calibration is missing. Accuracy will be compromised. Resolution: Replace the Meter Body or return the device for Factory Calibration.
No DAC Compensation	DAC Temp Comp	Possible causes: No DAC calibration has been performed on the device. Resolution: Perform DAC calibration for precise analog output measurement.
CJ Out of Limit	CJ Range	Possible causes: Cold Junction temperature is greater than 85C or less than -40C. Resolution: Verify the environment temperature is within specification. Reset the device. If problem persists, replace the Terminal board assembly.
Sensor Input Open	Temp Input and/or Temp Input TB6	Possible causes: Sensor input is open. Resolution: check for loose or open wires on the sensor (thermocouple or RTD). If connections are ok and problem persists, replace the sensor (thermocouple or RTD). If problem persists, replace the Terminal board assembly.
Sensor Unreliable Comm	Meter Body Comm and/or Temp Comm	Possible causes: Either the transmitter is installed in a noisy environment or internal communication quality between the Electronics Module and Sensor is degrading. Resolution: Call service person.
Low Supply Voltage	Supply Voltage	Possible causes: The supply voltage to the transmitter terminals is too low or the supply voltage to the Sensor board is too low. Resolution: Check that the power supply and loop resistance are within specification. If possible, try to increase the voltage level of the supply. If supply voltage and loop resistance are adequate and the problem persists, replace the Electronics Module. If the problem still persists, replace the Meter Body.

Flow Calculation Details	Flow Divide by 0 and/or Flow Sqrt of Neg and/or Flow Direction and/or Flow SP/PT Comp	- Whenever in the equation 1/0 condition arises, this bit will set - Whenever the Dp is negative, this bit will set - Whenever the flow is going in opposite direction, this bit will set -whenever failsafe is off & PV2/PV3 fails
Flow Calculation Details	Flow Divide by 0 and/or Flow Sqrt of Neg and/or Flow Direction and/or Flow SP/PT Comp	- Whenever in the equation 1/0 condition arises, this bit will set - Whenever the Dp is negative, this bit will set - Whenever the flow is going in opposite direction, this bit will set -whenever failsafe is off & PV2/PV3 fails
DP/SP/PT/FLOW Simulation Mode	DP Simulation and/or SP Simulation and/or PT Simulation and/or Flow Simulation	Possible causes: Transmitter is simulating input for DP/SP/PT/Flow Resolution: Exit the simulation mode.

10.3 Troubleshooting Using the SCT

Using the SCT in the on-line mode you can check the transmitter status, identify diagnostic messages and access troubleshooting information so you can clear fault conditions.
The SMV diagnostic messages fall into any one of the following general categories:

- Status (Informational)
- Noncritical Status
- Critical Status
- Communications

Follow the steps in Table 54 to access diagnostic messages generated by the SMV 3000 and procedures for clearing transmitter fault conditions.

Table 55 - Accessing SMV 3000 Diagnostic Information using the SCT

Step	Action
1	**Connect the SCT to the SMV** and establish communications. (See Section 4.1.5 Establishing Communications for the procedure, if necessary.)
2	Select the **Status** Tab Card (if not selected already) to display a listing of the Gross Status and Detailed Status messages.
3	Refer to the **SCT on-line user manual** for descriptions of the status messages and corrective actions to clear faults.

ATTENTION
When critical status forces PV output into failsafe condition, record the messages before you cycle transmitter power OFF/ON to clear failsafe condition.

For more information on trouble shooting the SCT refer to the SCT manual, #34-ST-10-08

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11 Using DTMs

11.1 Introduction

The SMV 800 HART model supports DTMs running on Pactware or FDM / Experion. To set up the DTM network on the FDM/Experion, refer to the *FDM/Experion User Guide*. In this manual, the procedure is given to run the SMV 800 HART DTM on Pactware (Version 4.1 or above).

11.2 Components

In order to be able to use the HART DTM you need the following:

- PACTware or some other Container application.
- Microsoft .NET Framework
- Latest HART Communication DTM: Free version of HART Communication DTM available for download from CodeWrights website.
- Honeywell HART DTM Library
- Viator modem from MacTek: RS-232 interface for HART Networks

11.3 Downloads

- **Download 1**: Pactware 4.x and .NET 2.0
  Download from www.pactware.com
- **Download 2**: HART Communication DTM\
  Download from http://www.codewrights.biz/
- **Download 3**: Honeywell HART DTM Library
  Download from HPS web site

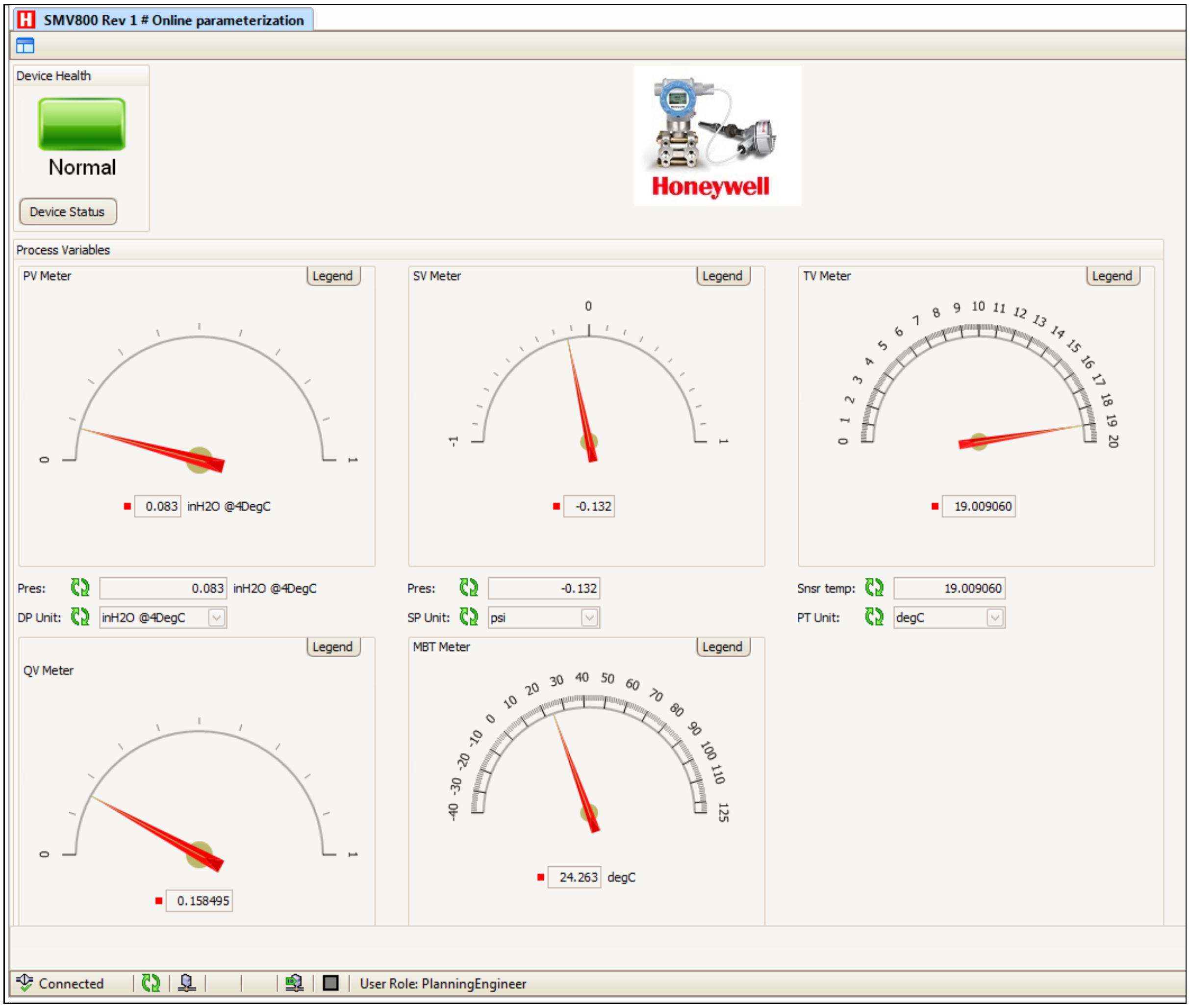
11.4 Procedure to Install and Run the DTM

1. Install the Download 1, 2, or 3 above.
2. Connect the Transmitter to the 30 V DC power supply with a 250 ohm loop resistor.
3. Connect the Viator modem terminals to the Transmitter power terminals.
4. Connect the Viator modem DB9 connector to the PC COM port.
5. Run Pactware. Select Update Device Catalog before adding Device (before adding HART Comm DTM).
6. Add Device – Add HART Comm DTM.
7. Right click on HART DTM, select Connect.
8. Right Click on HART Comm DTM and select Add device.
9. Add the Device DTM from for your device from the list (for example: SMV 800 DevRev 1).
10. Right Click on Device DTM, and select Connect.
11. Right click on Device DTM, and select Parameter/online parameterization. You should see Status "Connected" to be able to do configuration, calibration etc.
12. Browse through the menus to access various parameters/functions

The following sections provide a high level overview of SMV 800 DTM screens. The Menu structure is similar to the MCT404 Toolkit FDC application and behavior of the parameters / methods is the same as the MCT404 Toolkit FDC application. Refer to Table 21 for a complete listing of all the parameters and details. In the following sections, emphasis is given to show the various DTM screens.

11.5 SMV 800 Online Parameterization

On selecting Parameter/Online Parameterization, the DTM home page is displayed as shown below. The home page has three shortcuts: Device Setup, Basic Setup, and Calibration.



11.5.1 Device Health:

Shows Overall Device Status
Normal, Warning or Failure depending upon the health of the device:

11.5.2 Process Variables:

Shows Process variables with their Ranges and Units

11.5.3 Device Setup:

Provides entry points for the below Screens:

- Standard Flow Setup
- Advanced Flow Setup
- Basic Setup
- Device Variable Mapping
- Differential Pressure Configuration
- Static Pressure Configuration
- Process Temperature Configuration
- Flow Configuration
- Meterbody Temperature Configuration
- Process variables
- Calibration
- Device Status
- Diagnostics
- Services
- Detailed Setup
- Meterbody Details
- Display Setup
- Upgrade Options
- Review

11.5.4 Basic Setup

- Provides quick access to device identity details

11.5.5 Calibration:

- Provides quick access to all the Calibration functions

Refer to Table 21 the for more details

11.6 Advanced Flow Setup (for DTM only)

Advanced Flow Setup allows the user to configure the Flow setup in an easy and intuitive way.

11.6.6 Unit Configuration

Provides option to select U.S Units, S.I. Units or predefined Custom units for Pressure, Temperaure, Length, Viscosity and Density, Length parameters during Flow Configuration.

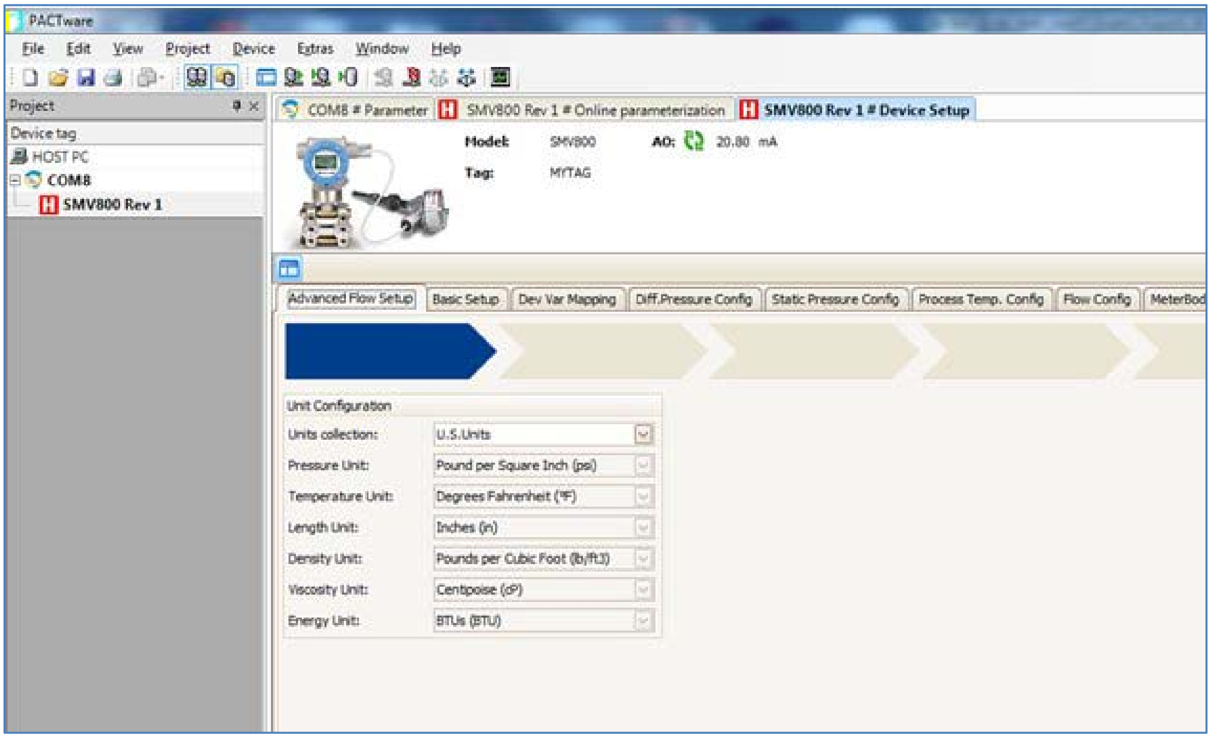


Table 56 – Unit Configuration

Parameters	**Units Selection**		
	U.S. Units	S.I. Units	Custom Units
Pressure	Pounds per Square Inch (psi)	Kilopascals (kPa)	• Pound per Square Inch (psi) • Bar (bar) • Kilopascals (kPa) • Megapascals (MPa)
Temperature	Degrees Fahrenheit (°F)	Degrees Celsius (°C)	• Degrees Fahrenheit (°F) • Degrees Celsius (°C)
Length	Inches (in)	Millimeters (mm)	• Inches (in) • Millimeters (mm)
Density	Pounds per Cubic Foot ($lb/ft^{3)}$	Kilograms per Cubic Meter ($kg/m^{3)}$	• Pounds per Cubic Foot ($lb/ft^{3)}$ • Kilograms per Cubic Meter ($kg/m^{3)}$
Viscosity	Centipoise (cP)	Centipoise (cP)	• Centipoise (cP) • Pascal Seconds (Pa.s) • Pounds per Foot Seconds (lb/ft.s)

- Units Selection:
  - U.S. Units:
    - Default U.S. Unit as shown in Table xy will be set for Pressure, Temperature, Length, Density, Viscosity parameters on various Flow setup screens
  - S.I. Units
    - Default S.I. Unit as shown in Table xy will be set for Pressure, Temperature, Length, Density, Viscosity parameters on various Flow setup screens
  - Custom Units
    - Available Custom Unit options are shown in Table xy. User selected Custom Unit will be set for Pressure, Temperature, Length, Density, Viscosity parameters on various Flow setup screens.

11.6.7 Advanced Flow Setup

Configure Flow Setup parameters

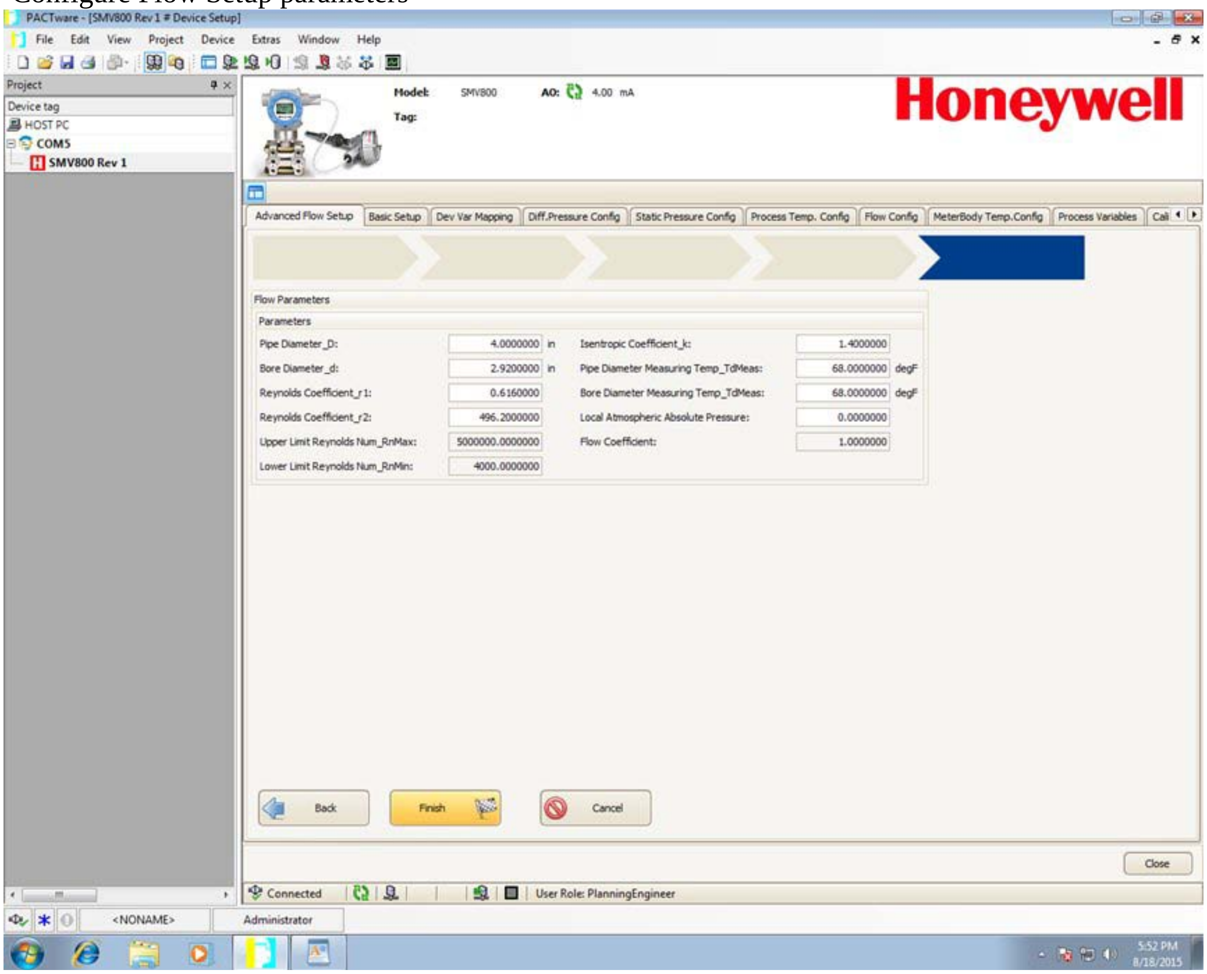


Table 57 – Configure Advanced Flow Setup

Menus/ Parameters	Options / Selections	Description/Valid values
Fluid Type	1. Gas 2. Liquid 3. Superheated Steam 4. Saturated Steam (DP,SP) 5. Saturated Steam (DP,PT)	1,2,3 – applicable when: Algorithm Options = SMV 800 or SMV 3000. 4,5 – applicable when Algorithm Options = SMV 800
Flow Output Type	• No Flow Output • Ideal Gas Actual Volume Flow • Ideal Gas Mass Flow • Ideal Gas Volume Flow @ Std Condition	When Fluid type = Gas
	• No Flow Output • Liquid Mass Flow • Liquid Actual Volume Flow • Liquid Volume Flow @ Std Condition	When Fluid type = Liquid
	• No Flow Output • Steam Mass Flow	When Fluid type = Superheated Steam or Saturated Steam (DP,SP) or Saturated Steam (DP,PT)
Algorithm Options	SMV 800 SMV3000	SMV800: Allows Flow calculation using newer Standards using predefined list of Primary Elements. SMV3000: Allows selecting legacy SMV3000 algorithms and Primary Elements
Equation Model	Dynamic Standard	Dynamic option allowed on SMV800 Algorithm or SMV3000 Algorithm. Select SMV3000 Algorithm Option sf you need to calculate Standard Flow
Primary Element Type	Orifice Nozzle Venturi Pitot Tube VCone Wedge	When Algorithm Options = SMV800
	Orifice Nozzle Venturi Pitot Tube	When Algorithm Options = SMV 3000

Primary Element	Orifice ASME-MFC-3-2004 Flange Pressure Taps Orifice ASME-MFC-3-2004 Corner Pressure Taps Orifice ASME-MFC-3-2004 D and D/2 Pressure Taps Orifice ISO5167-2003 Flange Pressure Taps Orifice ISO5167-2003 Corner Pressure Taps Orifice ISO5167-2003 D and D/2 Pressure Taps Orifice GOST 8.586-2005 Flange Pressure Taps Orifice GOST 8.586-2005 Corner Pressure Taps Orifice GOST 8.586-2005 Three-Radius Pressure Taps Orifice AGA3-2003 Flange Pressure Taps Orifice AGA3-2003 Corner Pressure Taps Nozzle ASME-MFC-3-2004 ASME Long Radius Nozzles Nozzle ASME-MFC-3-2004 Venturi Nozzles Nozzle ASME-MFC-3-2004 ISA 1932 Nozzles Nozzle ISO5167-2003 Long Radius Nozzles Nozzle ISO5167-2003 Venturi Nozzles Nozzle ISO5167-2003 ISA 1932 Nozzles Nozzle GOST 8.586-2005 Long Radius Nozzles Nozzle GOST 8.586-2005 Venturi Nozzles Nozzle GOST 8.586-2005 ISA 1932 Nozzles Venturi ASME-MFC-3-2004 “As-Cast” Convergent Section Venturi ASME-MFC-3-2004 Machined Convergent Section Venturi ASME-MFC-3-2004 Rough-Welded Convergent Section Venturi ISO5167-2003 “As-Cast” Convergent Section Venturi ISO5167-2003 Machined Convergent Section Venturi ISO5167-2003 Rough-Welded Sheet-Iron Convergent Section Venturi GOST 8.586-2005 Cast Upstream Cone Part Venturi GOST 8.586-2005 Machined Upstream Cone Part Venturi GOST 8.586-2005 Welded Upstream Cone Part made of Sheet Steel Averaging Pitot Tube Standard V-Cone with Macrometer method	When Algorithm Options = SMV 800

Primary Element	Standard V-Cone with ASME method Wafer Cone with Macrometer method Wafer Cone with ASME method Wedge Integral Orifice	When Algorithm Options = SMV 800
	Orifice Flange Taps D >/= 2.3 inches Orifice Flange Taps 2 </= D </= 2.3 Orifice Corner Taps Orifice D and D/2 Taps Orifice 2.5 and 8D Taps Venturi Machined Inlet Venturi Rough Cast Inlet Venturi Rough Welded Sheet-Iron Inlet Leopold Venturi Gerand Venturi Universal Venturi Tube Low-Loss Venturi Tube Nozzle Long radius Nozzle Venturi Preso Elipse Ave. Pitot Tube Other (Std compensation mode) Pitot Tube	When Algorithm Options = SMV 3000
Flow Calc Standard	ASME-MFC-3M ISO5167 GOST AGA3 VCONE/WAFER CONE ASME-MFC-14M WEDGE AVERAGE PITOT TUBE INTEGRAL ORIFICE CONDITIONAL ORIFICE CONDITIONAL ORIFICE	When Algorithm Options = SMV 800 Automatically set based on Primary Element type and Primary Element
	ASME 1989	When Algorithm Options = SMV 3000
Pipe Material	304 Stainless Steel 316 Stainless Steel 304/316 Stainless Steel Carbon Steel Hastelloy Monel 400 Other	When Flow Calc Standard is other than GOST
	35П 45П 20ХМП 12Х18Н9ТП 15К,20К 22К 16ГС 09Г2С 10 15	When Flow Calc Standard is GOST

Pipe Material	20 30,35 40,45 10Г2 38ХА 40Х 15ХМ 30ХМ,30ХМА 12Х1МФ 25Х1МФ 25Х2МФ 15Х5М 18Х2Н4МА 38ХН3МФА 08Х13 12Х13 30Х13 10Х14Г14Н14Т 08Х18Н10 12Х18Н9Т 12Х18Н10Т 12Х18Н12Т 08Х18Н10Т 08Х22Н6Т 37Х12Н8Г8МФБ 31Х19Н9МВБТ 06ХН28МдТ 20П 25П	When Flow Calc Standard is GOST
Pipe Thermal Exp Coefficient_alpha_D		Value is set based on the Pipe Material selected
Bore Material	304 Stainless Steel 316 Stainless Steel 304/316 Stainless Steel Carbon Steel Hastelloy Monel 400 Other	When Flow Calc Standard is other than GOST
	35П 45П 20ХМП 12Х18Н9ТП 15К,20К 22К 16ГС 09Г2С 10 15 20 30,35 40,45	When Flow Calc Standard is GOST

Bore Material	10Г2 38ХА 40Х 15ХМ 30ХМ,30ХМА 12Х1МФ 25Х1МФ 25Х2МФ 15Х5М 18Х2Н4МА 38ХН3МФА 08Х13 12Х13 30Х13 10Х14Г14Н14Т 08Х18Н10 12Х18Н9Т 12Х18Н10Т 12Х18Н12Т 08Х18Н10Т 08Х22Н6Т 37Х12Н8Г8МФБ 31Х19Н9МВБТ 06ХН28МдТ 20П 25П	When Flow Calc Standard is GOST
Bore Thermal Exp Coefficient_alpha_d		Value is set based on the Pipe Material selected

11.6.8 Flow Configurations Screen

Configure Discharge coefficients, compensation and failsafe settings and Simulation values

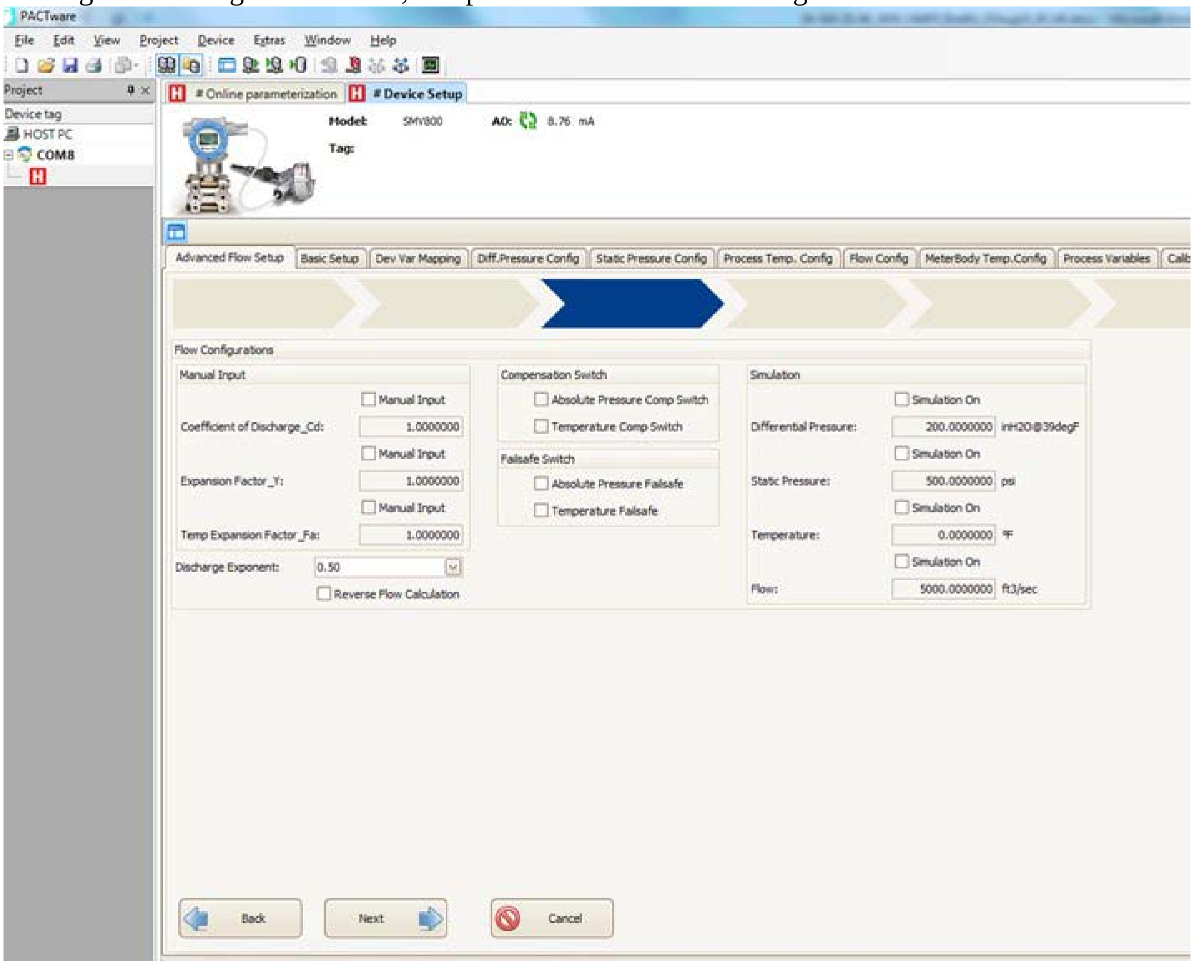


Table 58 - Flow Configuration

Manual Input		
Manual Input (for Coefficient of Discharge_Cd)	ON/OFF	
Coefficient of Discharge_Cd	(entry field when Manual Input is ON)	
Manual Input (for Expansion Factor_y)	ON/OFF	
Expansion Factor_Y	(entry field When Manual Input is ON)	
Manual Input (for Temp Expansion Factor_Fa)	ON/OFF	
Temp Expansion Factor_Fa	(entry field When Manual Input is ON)	
Discharge Exponent		
Reverse Flow	ON/OFF	

Compensation Switch		
Absolute Pressure Comp Switch	ON/OFF	Applicable when Equation Model is Standard. When ON, use Design Pressure for Flow Calculation when PV2 (Static Pressure) goes bad and PV2 Failsafe is OFF. When OFF, PV2 has no effect on Flow Calculation
Temperature Comp Switch	ON/OFF	Applicable when Equation Model is Standard. When ON, use Design Temperature for Flow Calculation when PV3 (Process Temperature) goes bad and PV3 Failsafe is OFF When OFF, PV3 has no effect on Flow Calculation
Failsafe Switch	ON/OFF	
Absolute Pressure Failsafe	ON/OFF	When ON, Device goes to burnout. When OFF, if PV2 is mapped to output, device goes to burnout on bad PV2. When OFF, if PV4 is mapped to output, PV4 is still good on bad PV2.
Temperature Failsafe	ON/OFF	When ON, Device goes to burnout. When OFF, if PV3 is mapped to output, device goes to burnout on Bad PV3 When OFF, if PV4 is mapped to output, PV4 is still good on bad PV3.
Simulation		
Simulate Differential Pressure (inH2O39F)	ON/OFF	
Simulate Static Pressure (psi)	ON/OFF	
Simulate Temperature (decC)	ON/OFF	
Simulate Mass Flow (ibm/sec)	ON/OFF	

11.6.9 Process Data Screen

Configure Viscosity and Density Coefficients, Design Temperature, Pressure, Nominal Temperature, Pressure values, Max values, KUser factor

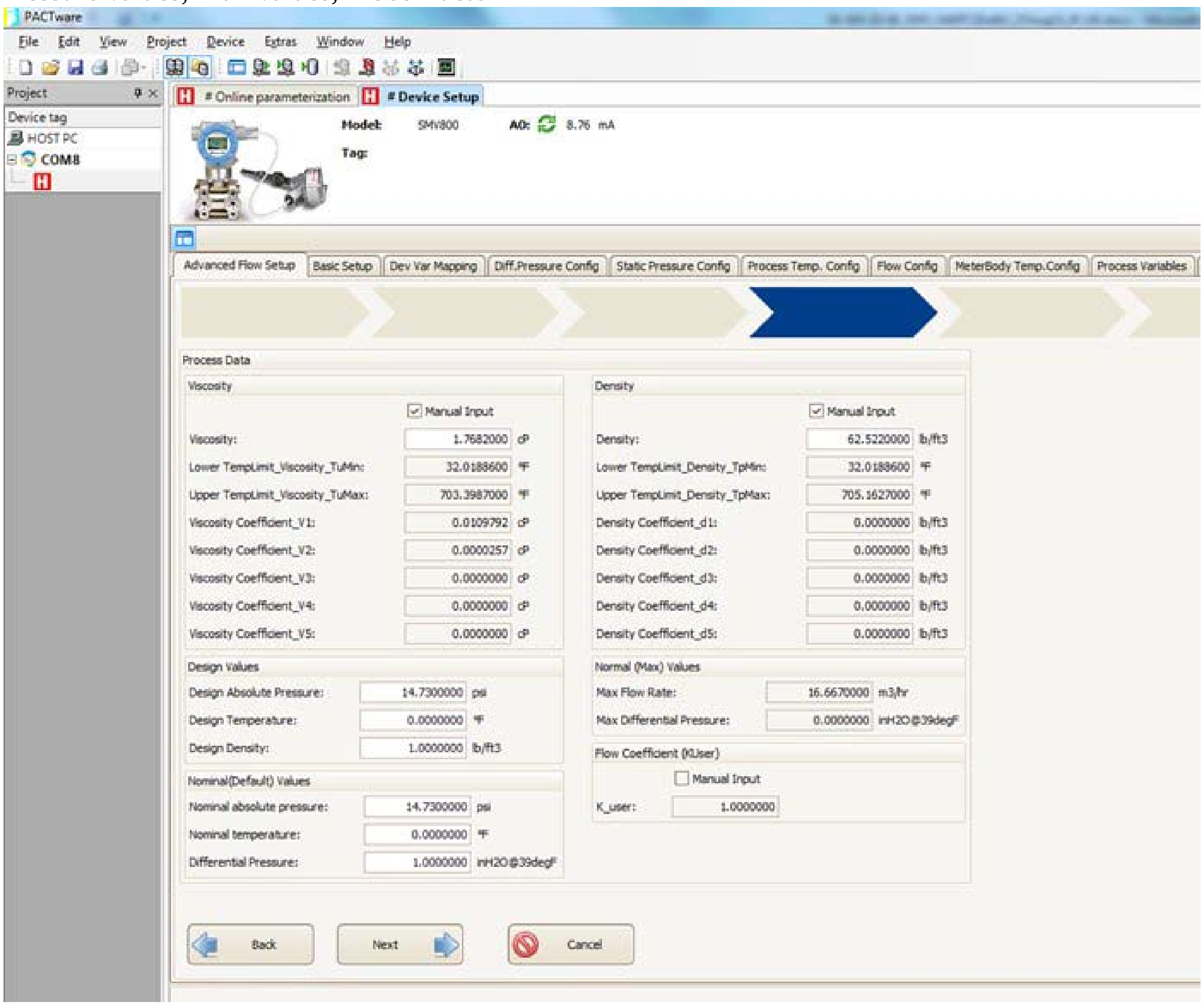


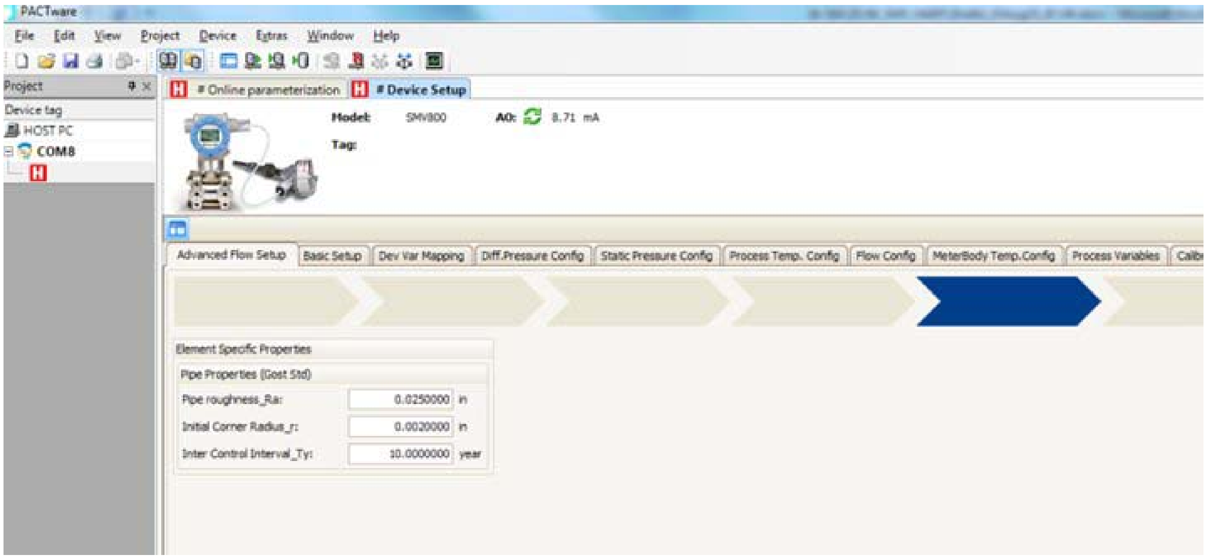
Table 59 – Process Data

Viscosity		
Manual Input Viscosity	ON/OFF	When Algorithm Option = SMV800
Viscosity Coefficient_V#	#.#	When Algorithm Option = SMV3000. Fluid Type = Gas, Steam, Liquid Equation Model = Dynamic (Gas, Steam), Dynamic or Standard (Liquid)
Lower TempLimit Viscosity TuMin	Deg F	Same as above
Upper TempLimit Viscosity TuMin	Deg F	Same as above
Design Values		
Design Absolute Pressure	PSIA	
Design Temperature	Deg F	
Design Density	Lb/ft3	
Base Density	Lb/ft3	Algorithm Option = SMV3000
Nominal (Default) Values		
Nominal Absolute Pressure	PSIA	
Nominal Temperature	Deg F	

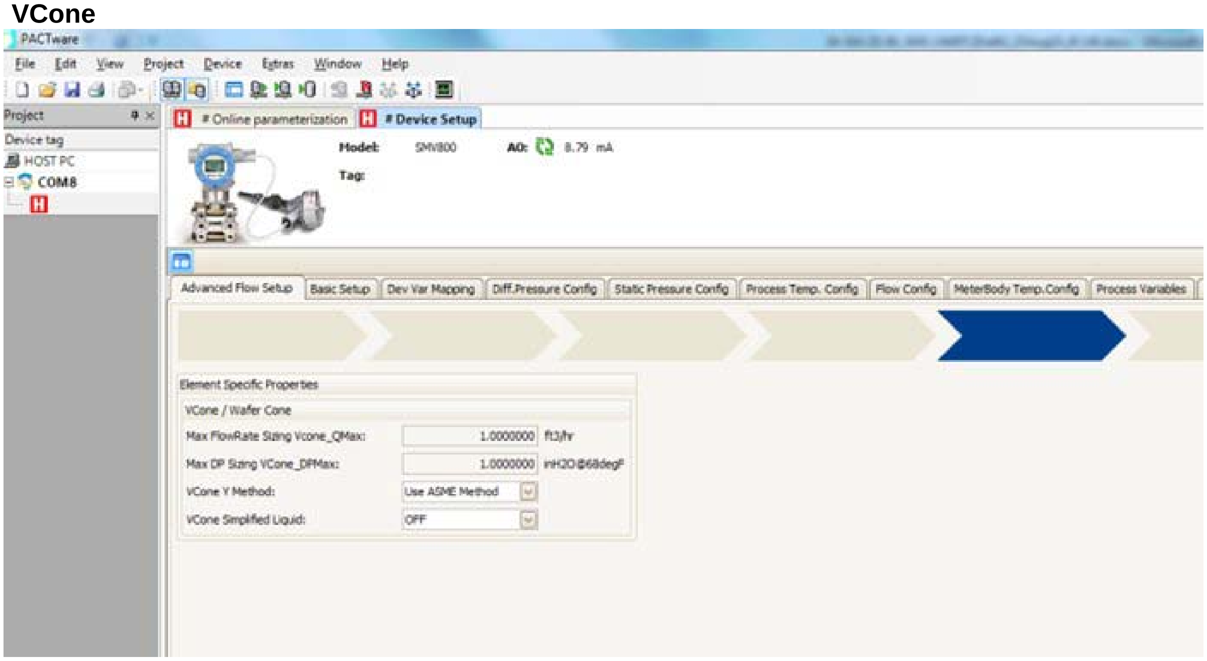
Nominal Differential Pressure	InH2O39F	
Density		
Manual Input Density	ON/OFF	When Algorithm Option = SMV800. Fluid Type = Liquid
Density Coefficient_d#	#.#	When Algorithm Option = SMV3000. Fluid Type = Liquid Equation Model = Dynamic or Standard
Lower TempLimit Density TpMin	Deg F	Same as above
Upper TempLimit Density TpMin	Deg F	Same as Above
Normal (Max) Volume		
Max Flow Rate	Kg/min	When Algorithm Option = SMV3000, Equation Model = Standard
Max Differential Pressure	InH2O39F	Same as above
Flow Coefficient (KUser)		Same as Above
Manual Input	ON/OFF	
KUser Value	#.#	Same as Above
Calculate KUser		Same as Above

11.6.10 Element Specific Properties screen

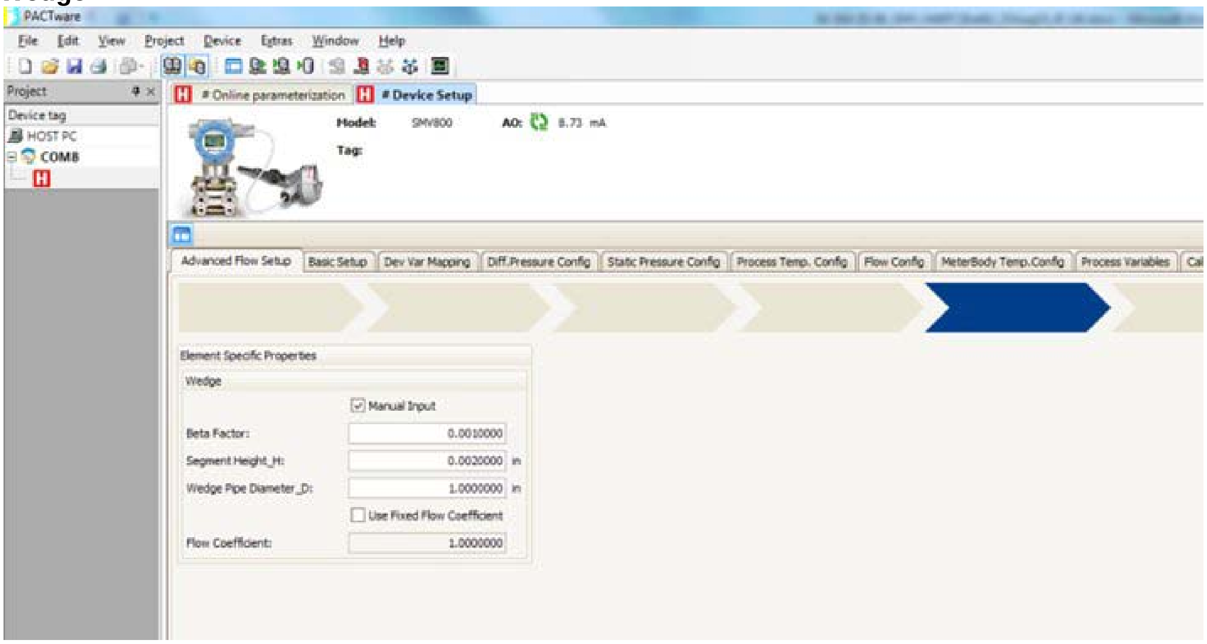
Configure properties specific to selected Primary Element or Standard: Gost, WEDGE, VCone, Conditional Orifice



VCone



Wedge



Conditional Orifice

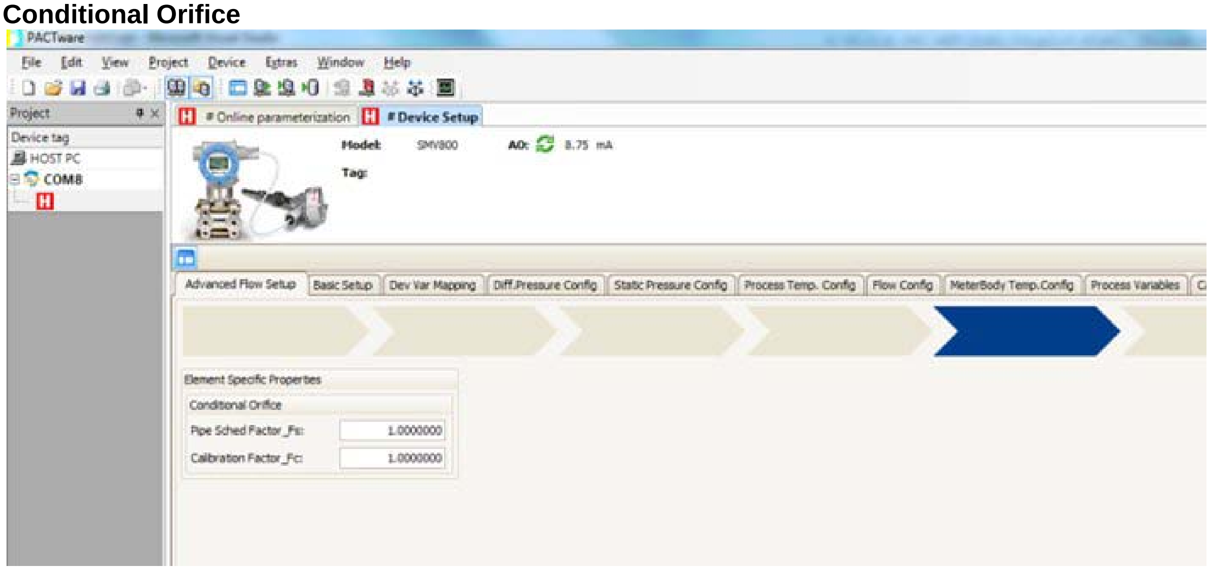


Table 60 - Element Specific Properties

WEDGE		
Beta Factor		
Segnent Height_H	in	
Wedge Pipe Diameter_D	in	
Use Fixed Flow	ON/OFF	
VCone / Wafer Cone		
Max Flowrate Sizing VCone_Qmax	Ft3.hr	
Max Diff Pressure Sizing VCone_DPmax	inH2O39F	
VCone Y Method	McCrometer/ASME	
VCone Simplified Liquid	ON/OFF	
Pipe Properties (GOST std)		
Pipe roughness_Ra	in	
Internal Corner Radius_r	in	
Internal Corner Interval_Ty	year	
Conditional Orifice		
Pipe Sched Factor_Fa		
Calibration Factor_Fa		

11.6.11 Flow Parameters

Configure Flow Parameters

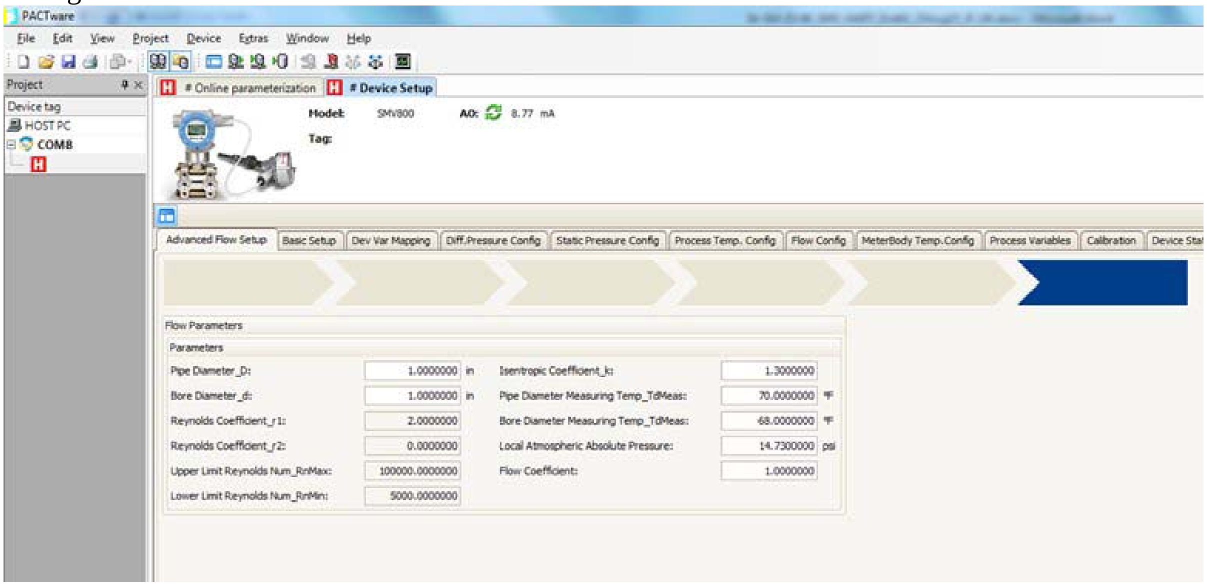
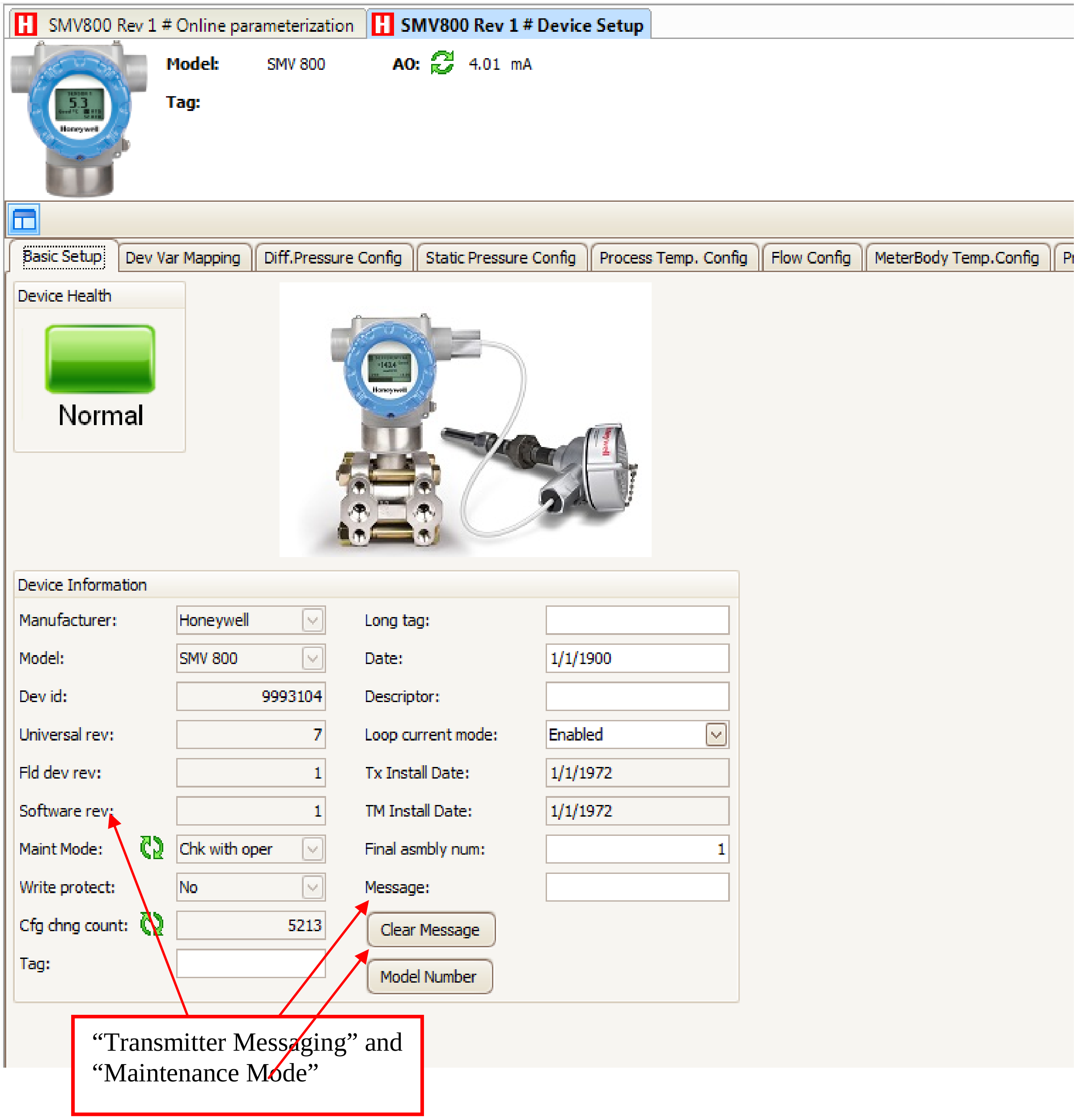


Table 61 – Flow Parameters

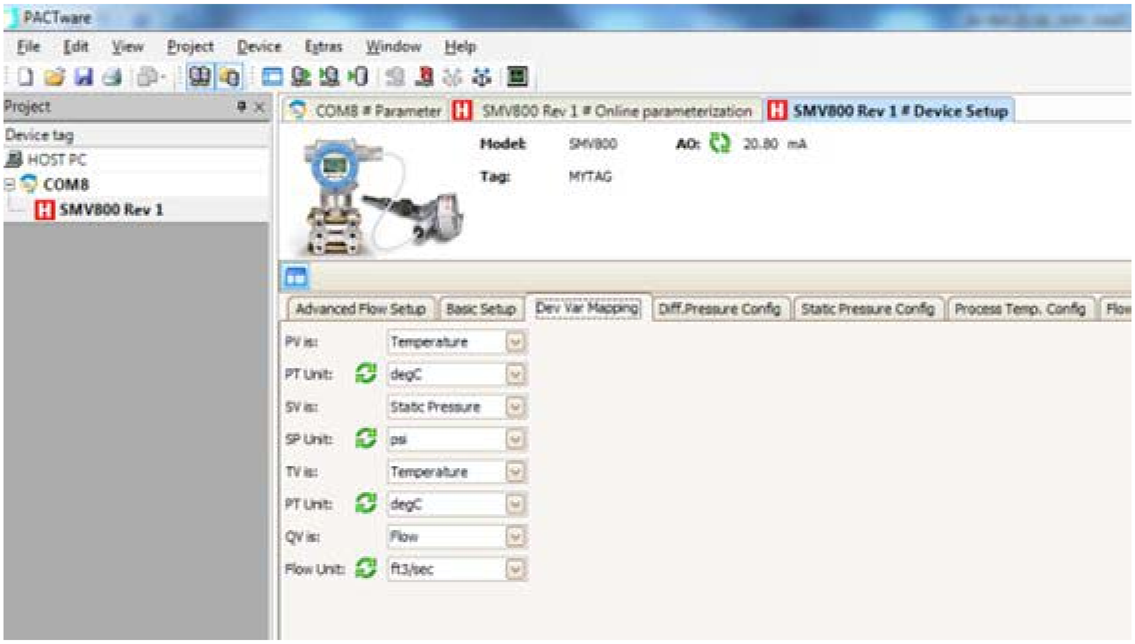
Parameters		
Pipe diameter_D	in	
Bore Diameter_d	in	
Reynolds Coefficient_r1		
Reynolds Coefficient_r2		
Upper Limit Reynolds Num_RnMax		
Lower Limit Reynolds Num_RnMax		
Isentropic Coefficient_k		
Pipe Diameter Measuring Temp_TDMeas	degF	
Bore Diameter Measuring Temp_TDMeas	degF	
Local Atmosheric Absolute Pressure	PSIA	
Flow Coefficient		

11.7 Basic Setup Page

Provides Device Identity, Tag and other details



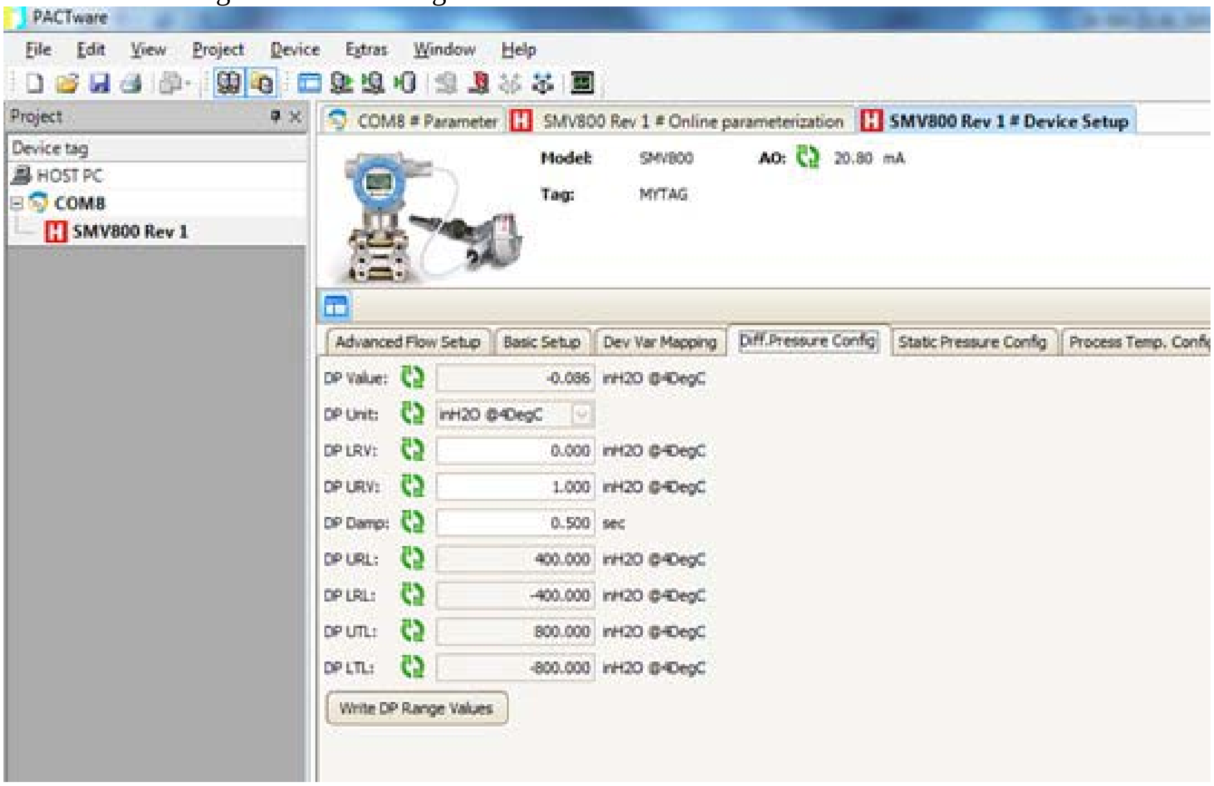
11.8 DevVar Mapping



Allows mapping Device variables to Dynamic variables. Refer Table 20 for parameter details.

11.9 Diff. Pressure Config

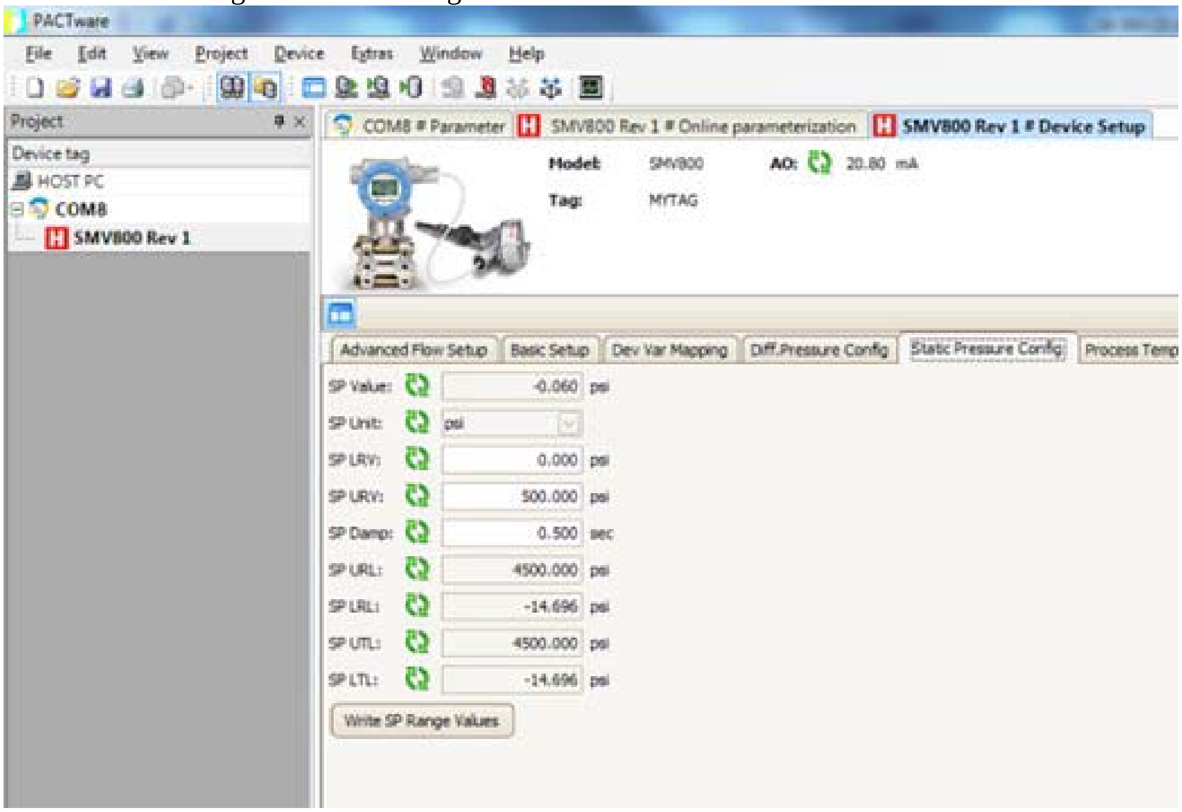
Allows Range and Units configuration for Pressure.



Refer Table 21 for Parameter Details

11.10 Static Pressure Config

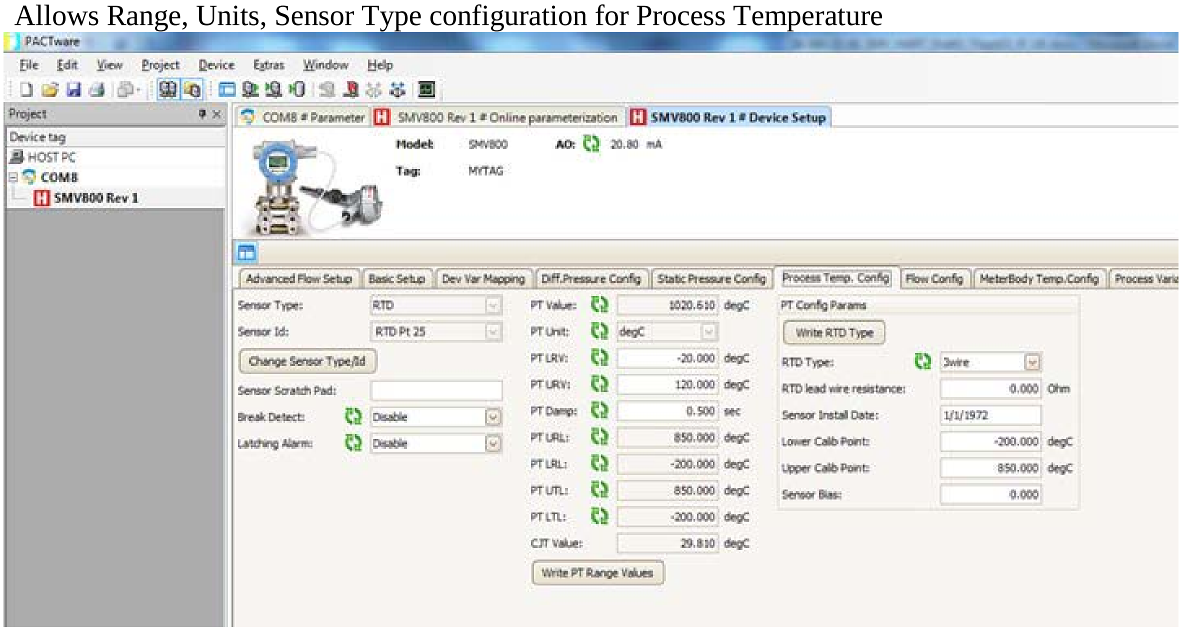
Allows Range and Units configuration for Static Pressure.



Refer Table 22 for Parameter Details

11.11 Process Temp. Config

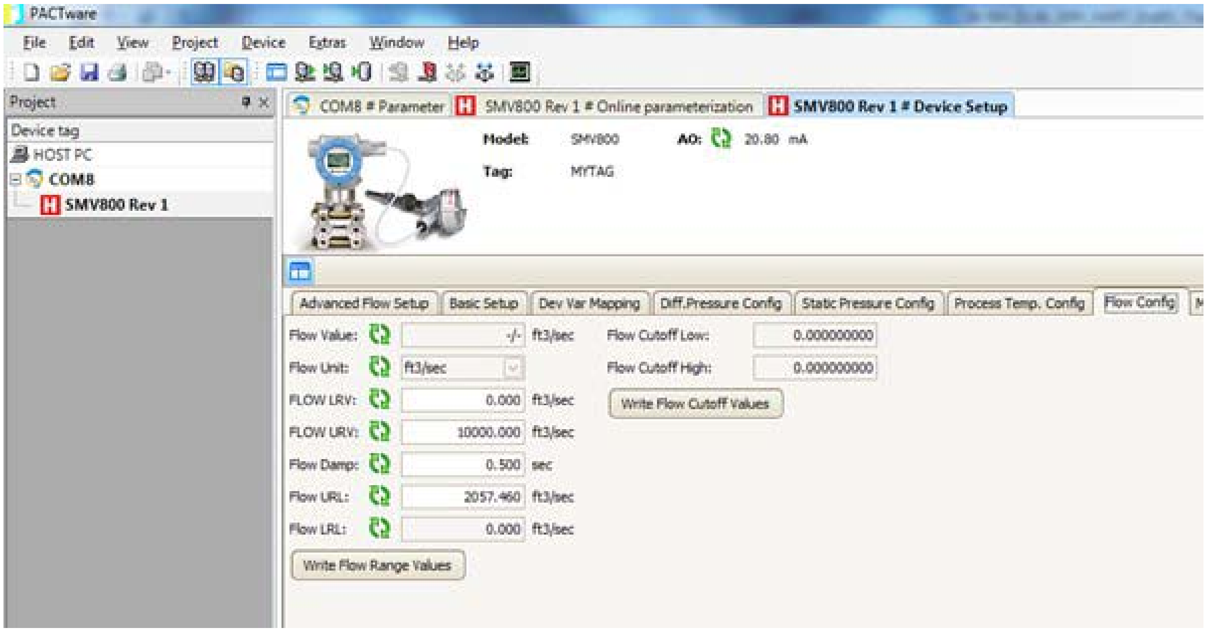
Allows Range, Units, Sensor Type configuration for Process Temperature



Refer Table 23 for Parameter Details

11.12 Flow Config

Allows Range and Units configuration for Flow.



Refer Table 24 for Parameter Details

PV4 (Flow) Upper Range Limit (URL) and Range Values (LRV and URV)

Set the URL, LRV, and URV for calculated flow rate PV4 output by typing in the desired values on the FlowConf tab card.

- URL = Type in the maximum range limit that is applicable for your process conditions. (100,000 = default)
- LRV = Type in the desired value (default = 0.0)
- URV = Type in the desired value (default = URL)

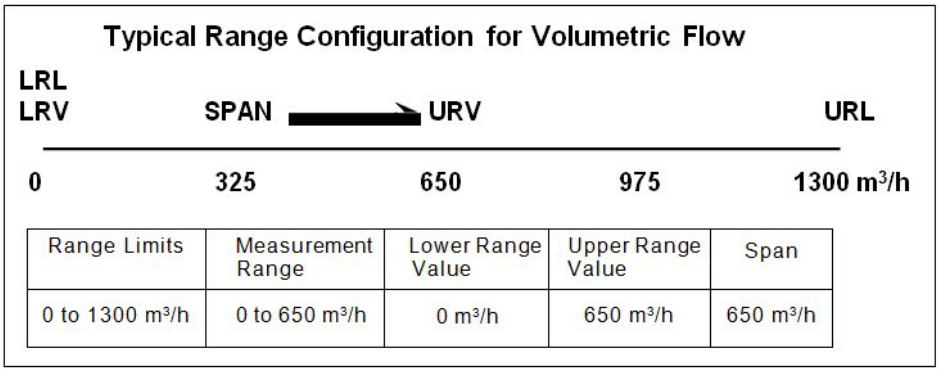
Be sure that you set the PV4 Upper Range Limit (URL) to desired value before you set PV4 range values. We suggest that you set the PV4 URL to equal two times the maximum flow rate (2 x URV).

About URL and LRL

The Lower Range Limit (LRL) and Upper Range Limit (URL) identify the minimum and maximum flow rates for the given PV4 calculation. The LRL is fixed at zero to represent a no flow condition. The URL, like the URV, depends on the calculated rate of flow that includes a scaling factor as well as pressure and/or temperature compensation. It is expressed as the maximum flow rate in the selected volumetric or mass flow engineering units.

About LRV and URV

The LRV and URV set the desired zero and span points for your calculated measurement range as shown in the example in Figure 22



Range Limits	Measurement Range	Lower Range Value	Upper Range Value	Span
0 to 1300 m^3/h	0 to 650 m^3/h	0 m^3/h	650 m^3/h	650 m^3/h

Figure 22 - Typical Volumetric Flow Range Setting Values

The default engineering units for volumetric flow rate is cubic meters per hour and tonnes per hour is the default engineering units for mass flow rate. The URV changes automatically to compensate for any changes in the LRV and maintain the present span (URV – LRV). If you must change both the LRV and URV, always change the LRV first).

Damping
Adjust the damping time constant for flow measurement (PV4) to reduce the output noise. We suggest that you set the damping to the smallest value that is reasonable for the process.

The damping values (in seconds) for PV4 are: 0.00d, 0.5, 1.0, 2.0, 3.0, 4.0, 5.0, 10.0, 50.0 and100.0
d Factory setting.

Low Flow Cutoff for PV4

For calculated flow rate (PV4), set low and high cutoff limits between 0 and 30% of Upper Range Limit for PV4 in engineering units.

- Low Flow Cutoff: Low (0.0 = default) High (0.0 = default)

Background
You can set low and high low flow cutoff limits for the transmitter output based on the calculated variable PV4. The transmitter will clamp the current output at zero percent flow when the flow rate goes below the configured low limit and will keep the output at zero percent until the flow rate rises to the configured high limit. This helps avoid errors caused by flow pulsations in range values close to zero. Note that you configure limit values in selected engineering units between 0 to 30% of the upper range limit for PV4.
When the flow rate goes below LRV, the output will be at Saturation and will read 3.8mA. When the Flow rate rises, and when reaches the Low Limit, the output will be at 4mA or 0% until the flow rate rises to the configured High limit.

Figure 23 gives a graphic representation of the low flow cutoff action for sample low and high limits in engineering units of liters per minute.

If the flow LRV is not zero, the low flow cutoff output value will be calculated on the LRV and will not be 0 %.

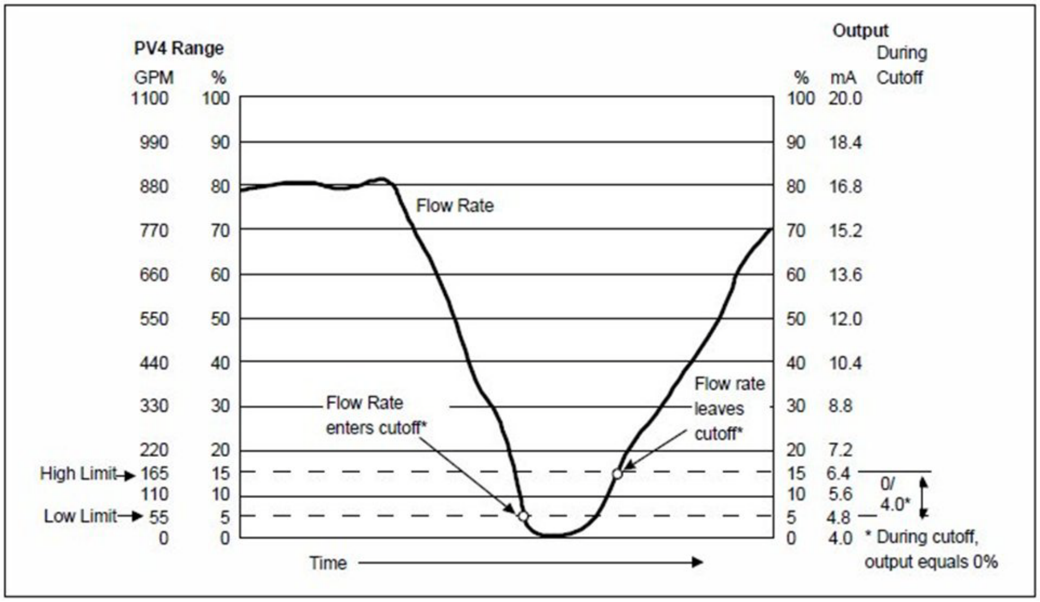
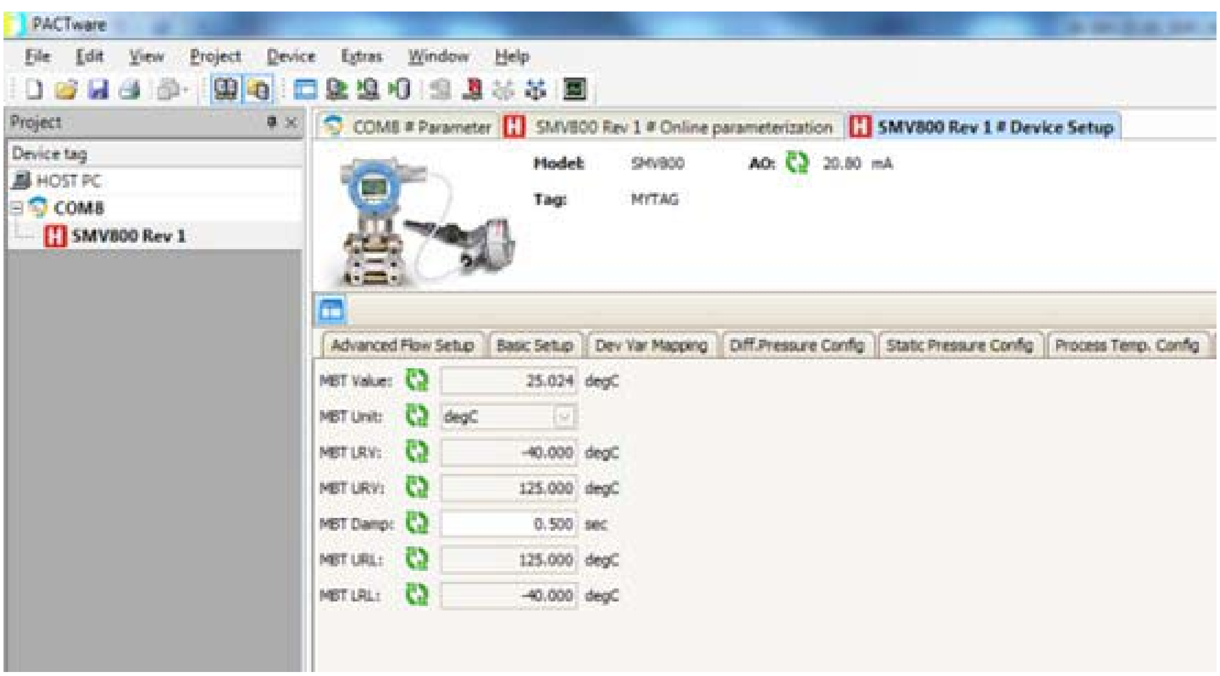


Figure 23 – Low Flow cutoff action

The low flow cutoff action also applies for reverse flow in the negative direction. For the sample shown in Figure 23, this would result in a low limit of –55 GPM and a high limit of –165 GPM.

11.13 Meter Body Temp. Config

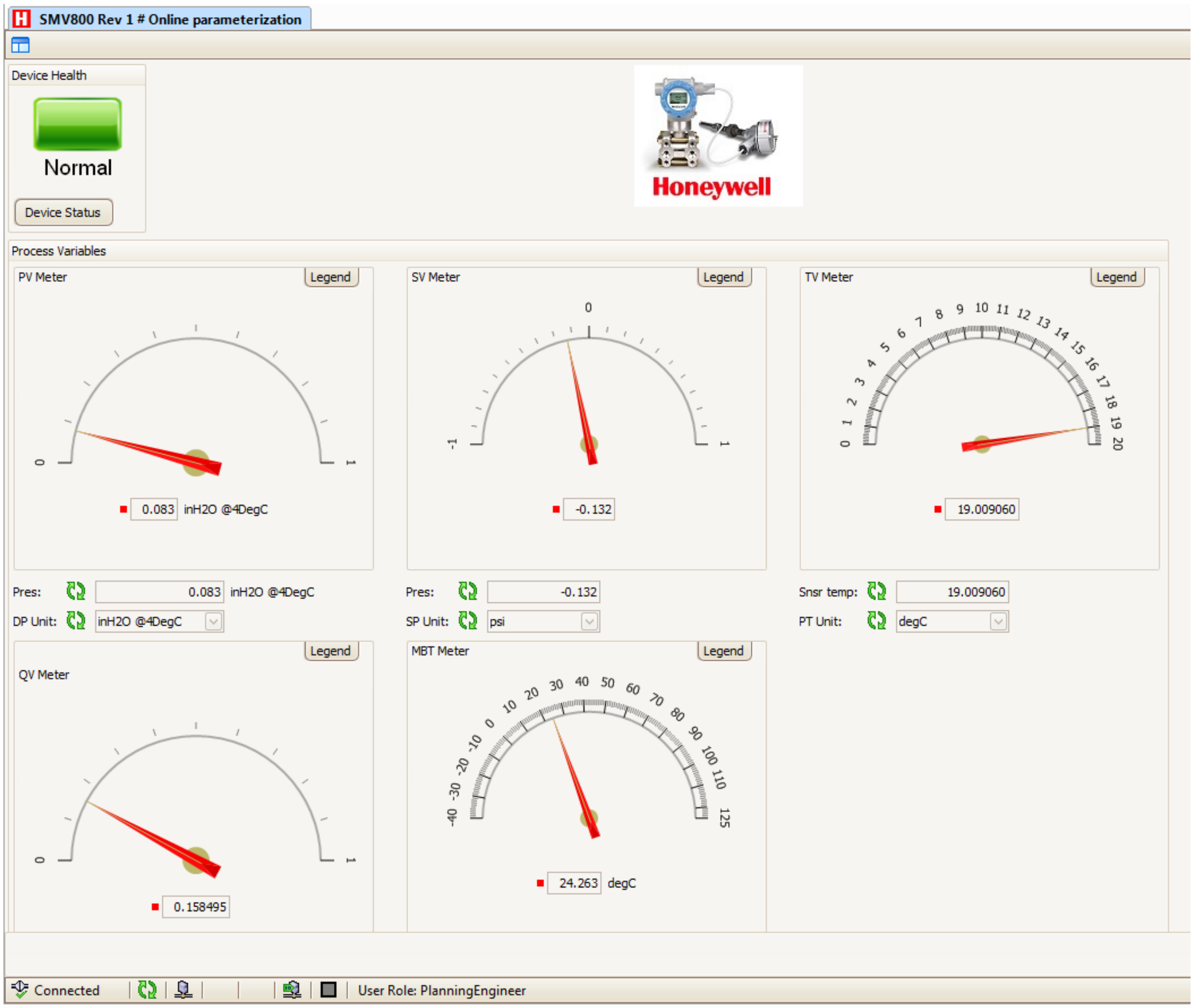
Allows Damping configuration for Meter Body Temperature



Refer Table 25 for Parameter Details

11.14 Process Variables

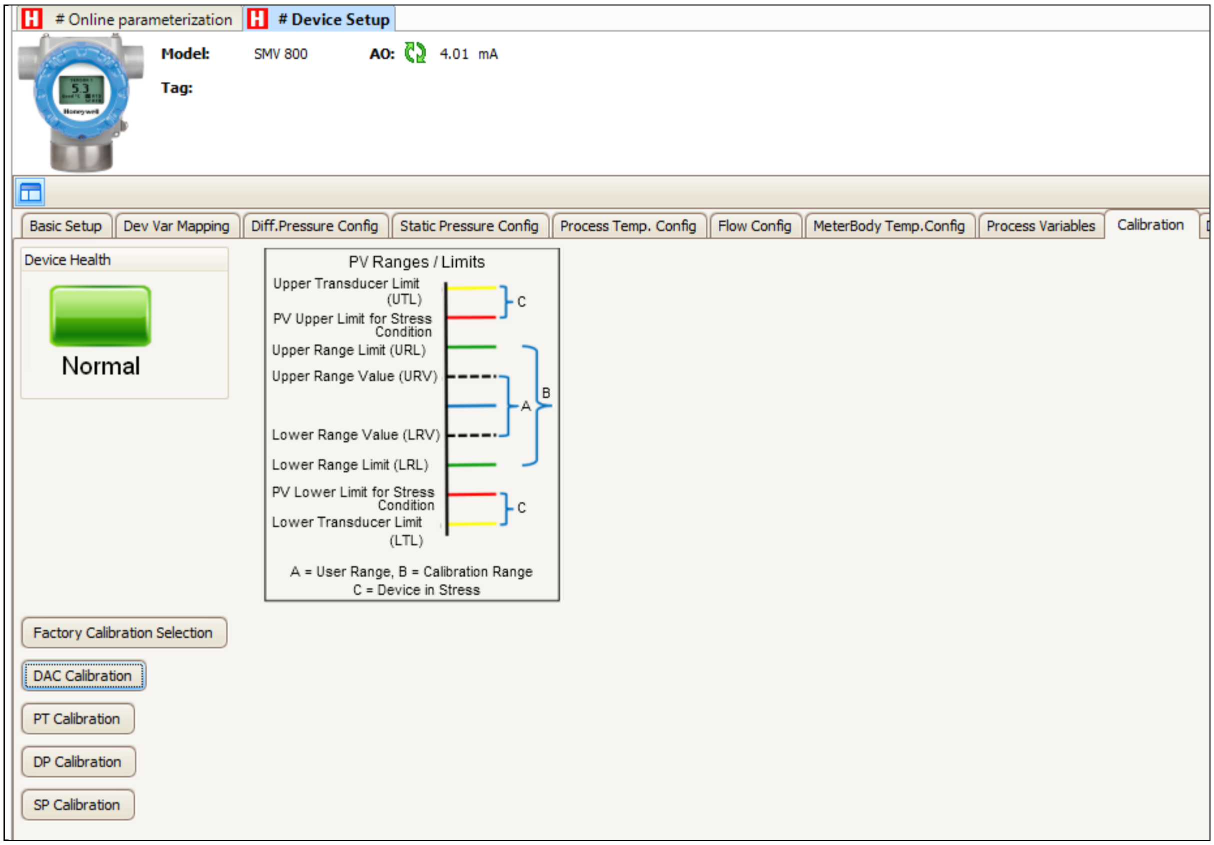
All the Process Variables are graphically represented in this screen. To see the Trend Charts, select Trend Chart button



Refer Table 26 for more details

11.15 Calibration

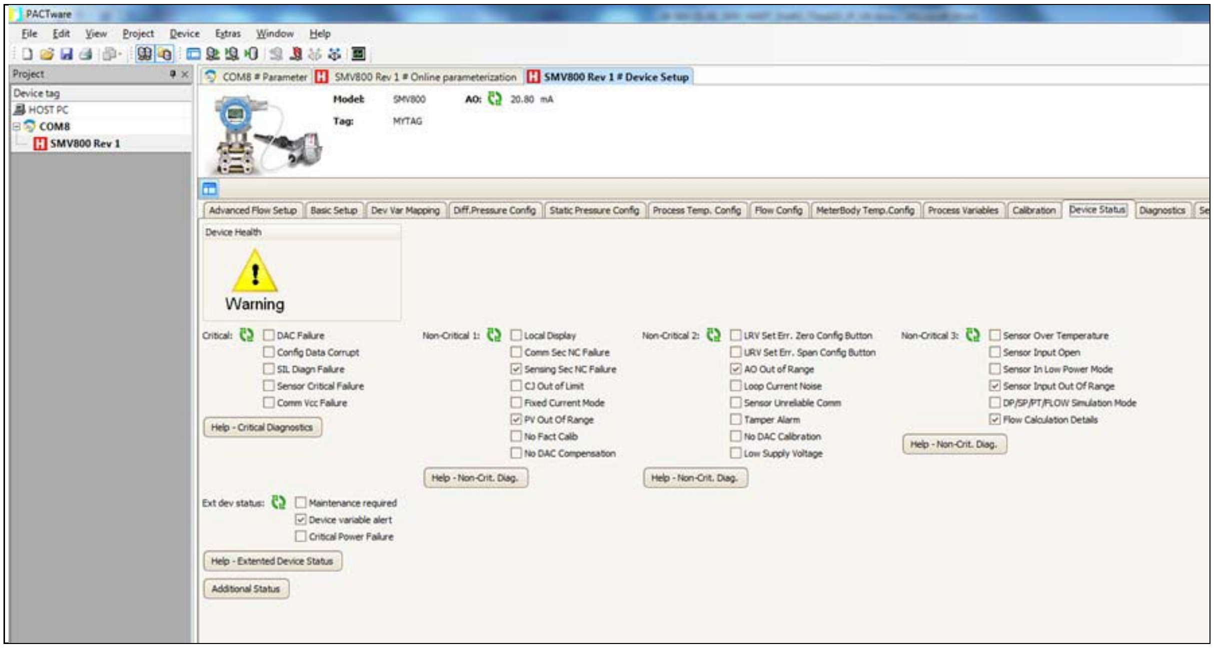
The Calibration Page provides access to all of the calibration methods and records.
Allows Calibration of Differential Pressure, Static Pressure, Process Temperature, and DAC. Also allows selecting one of the Available Factory Calibration options.



Refer Table 27 for more details

11.16 Device Status

Shows Critical and Non-Critical status and context-sensitive help when gliding the mouse over an individual status.

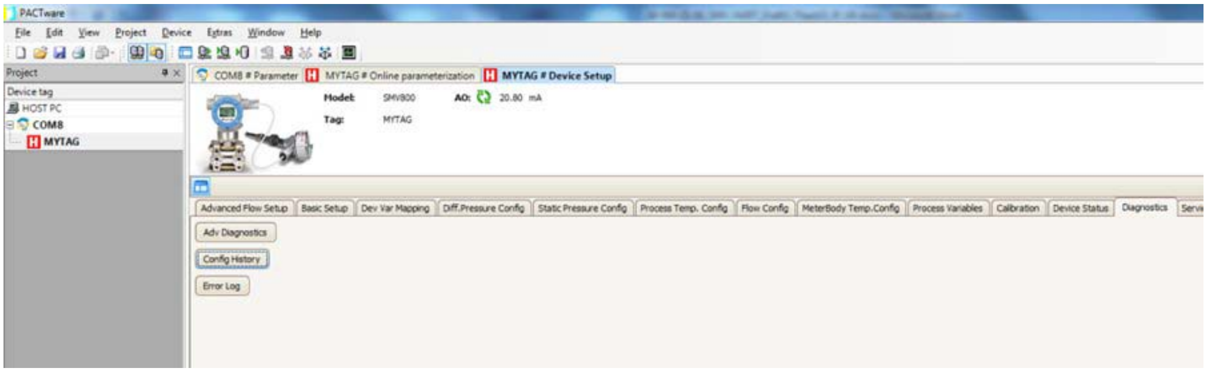


Refer Table 28 for more details

Refer “Troubleshooting and Maintenance” for more details on individual status details

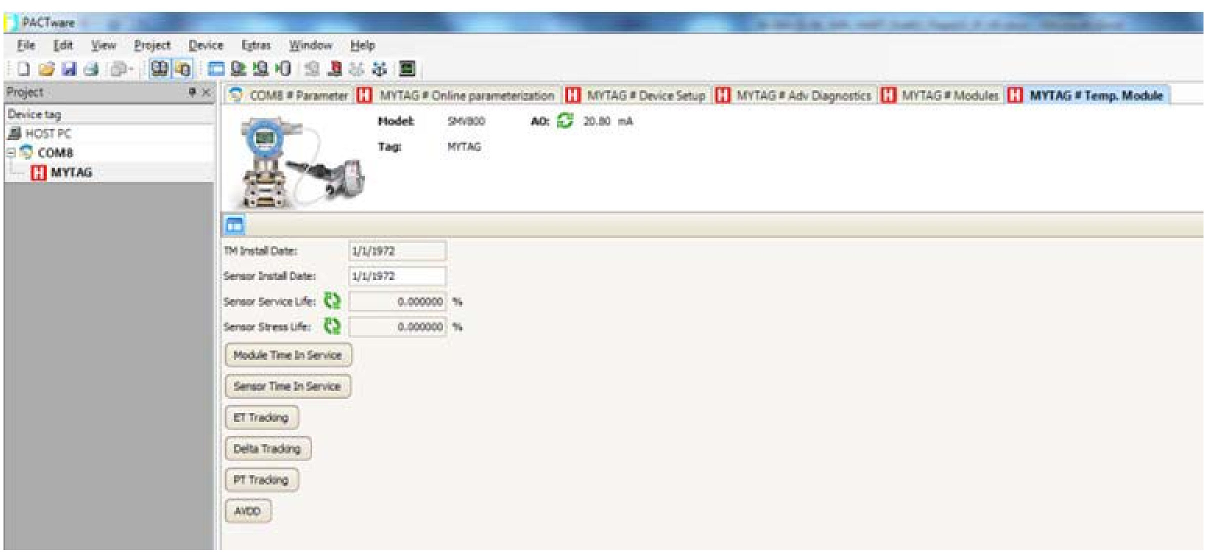
11.17 Diagnostics:

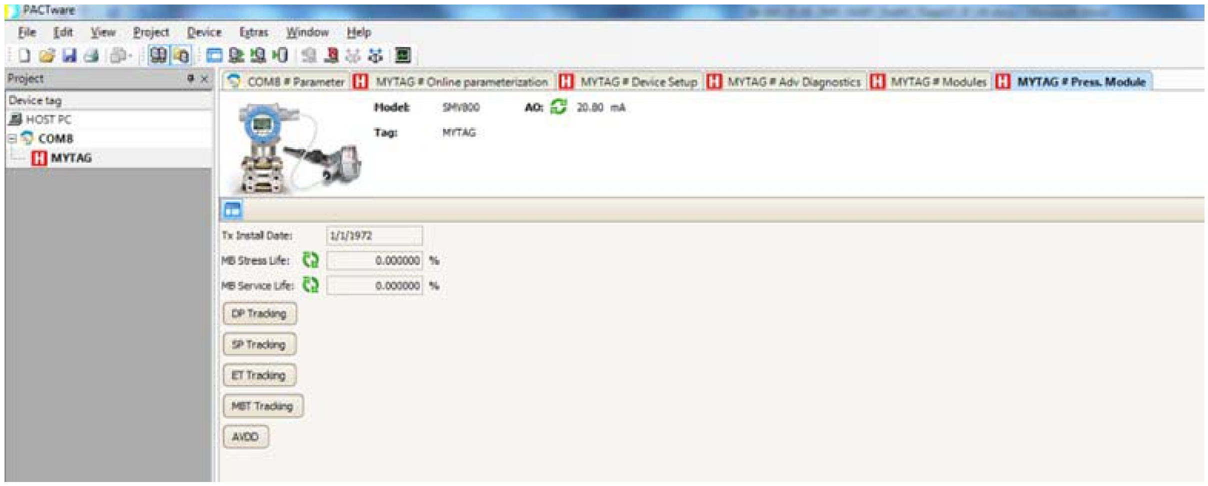
Provides access to the Advanced Diagnostics and Configuration History functions:



Access the relevant sub function button to read the Diagnostic parameters or run the Diagnostics Methods

Refer "HART Advanced Diagnostics" section for more details.



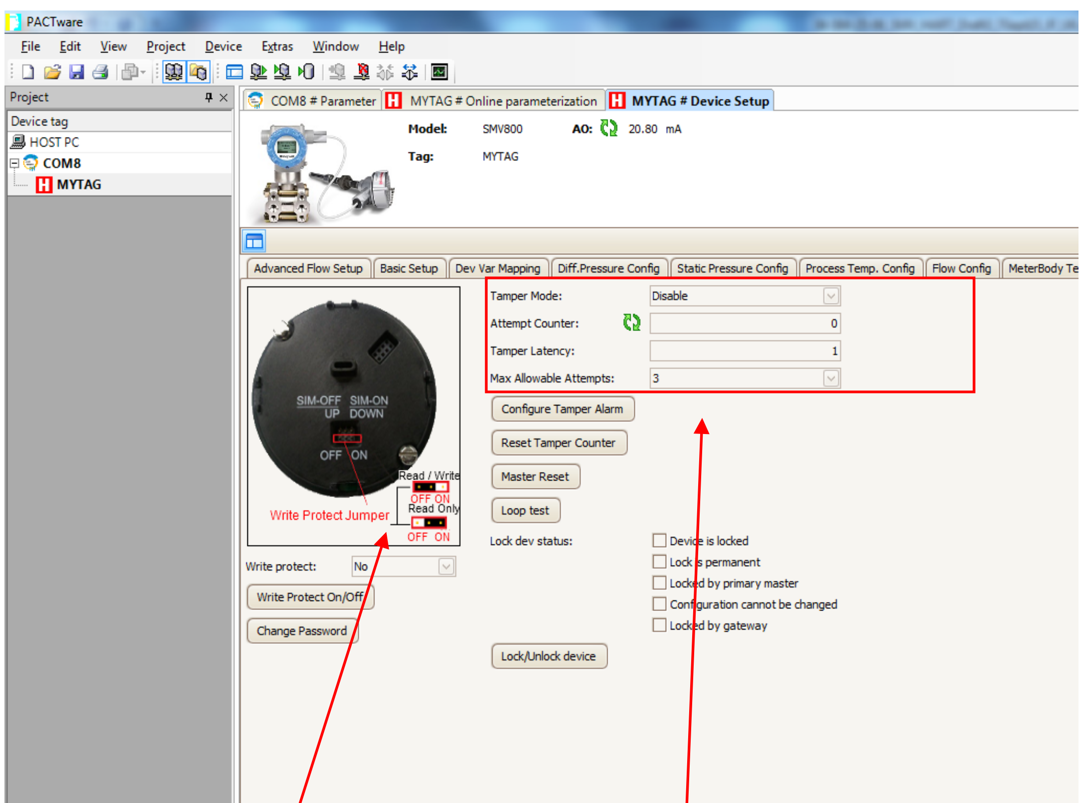


Refer Table 29 for complete details.

11.18 Services

This allows configuration of Tamper Alarm and Write Protect mode.

Refer "Device Configuration and Parameter Descriptions" for more details.



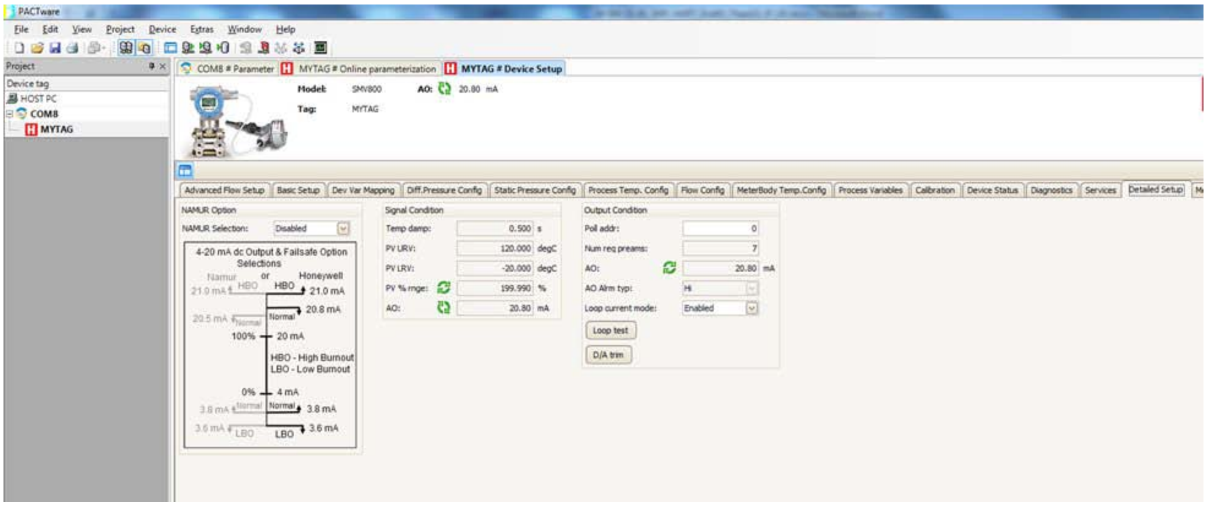
Refer Table 30 for more details

Write protect ON/OFF

Configuration of Tamper Alarm

11.19 Detailed Setup

Shows Sensor Limits, Output Condition, Signal Condition and Burnout level selections.

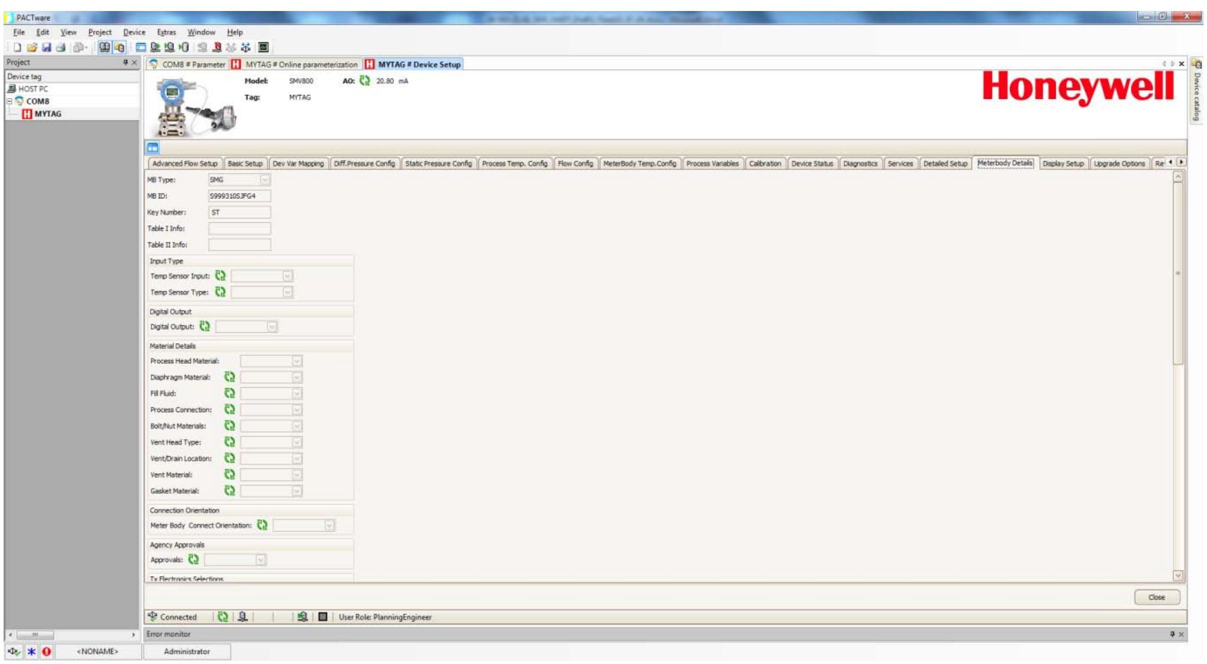


Refer Device Configuration and Parameter Descriptions for more details.

Refer Table 31 for more details

11.20 Meter body Details

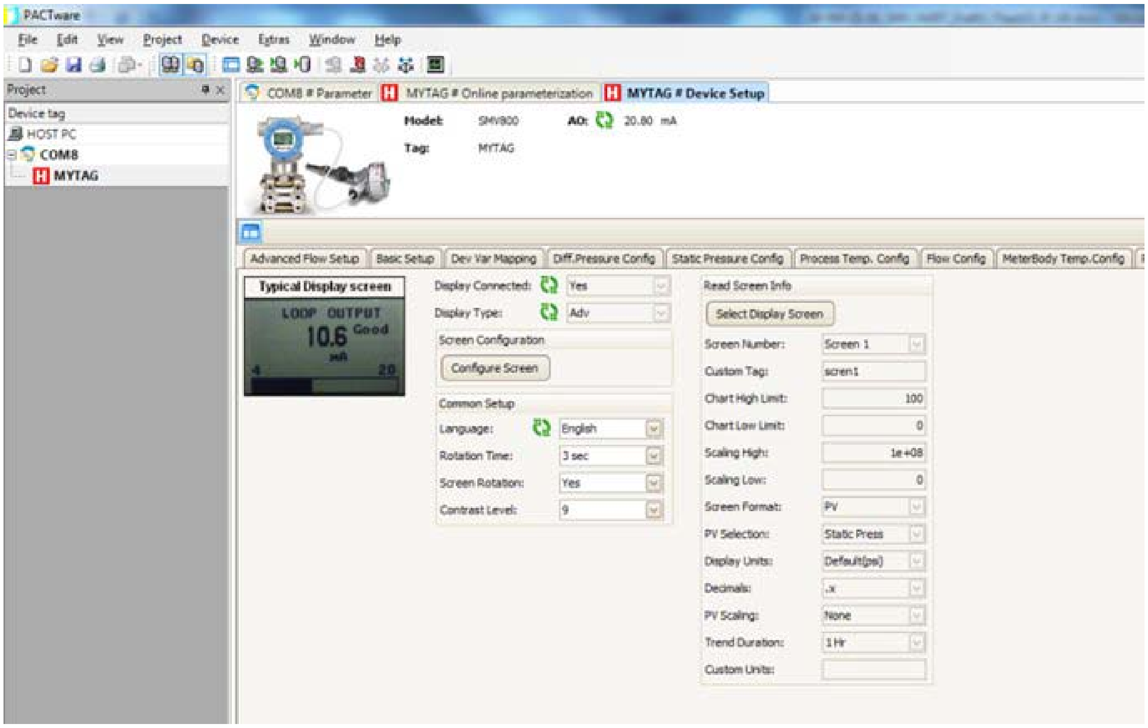
Select the Meter Body Selections to see the Material of Construction details



Refer Table 32 for more details

11.21 Display Setup

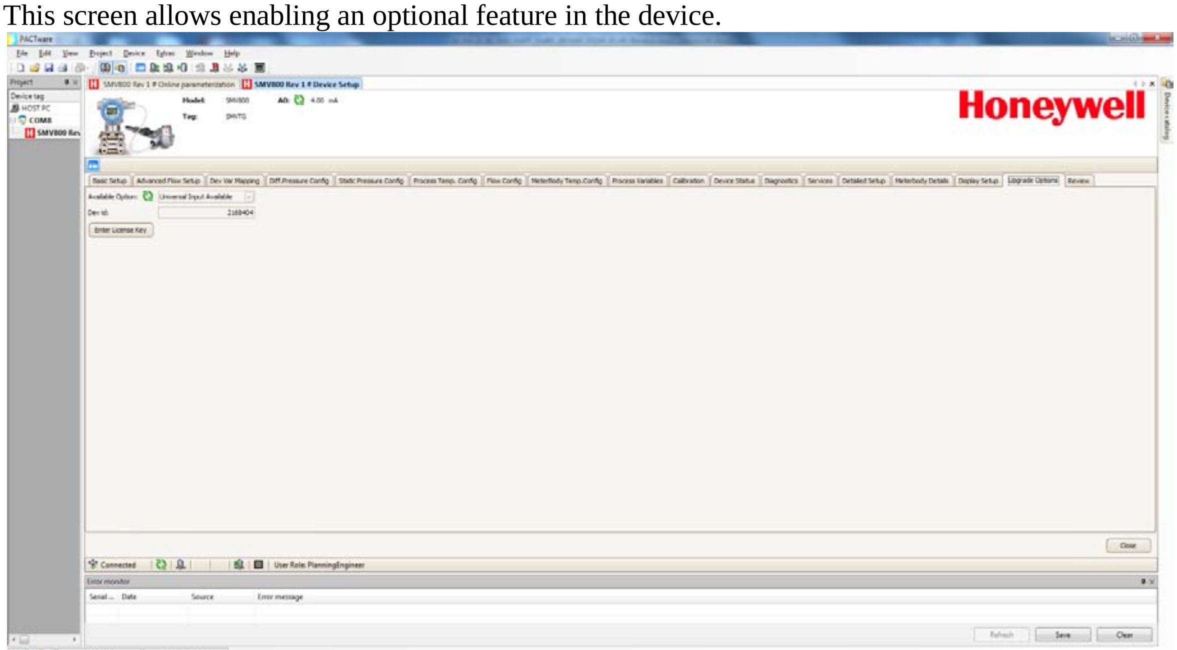
Allows configuring the Display from the Host.



Refer Table 33 for more details

11.22 Upgrade Options

This screen allows enabling an optional feature in the device.

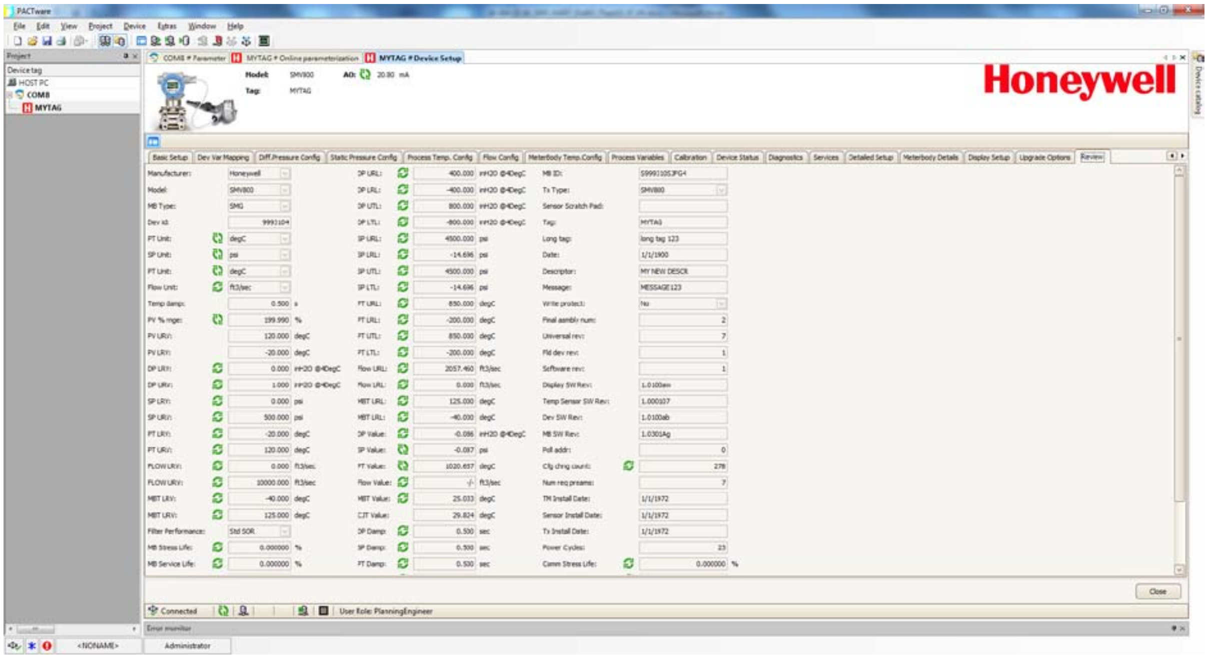


Refer Table 34 for more details

11.23

11.24 Review

Summary screen showing all the parameters.

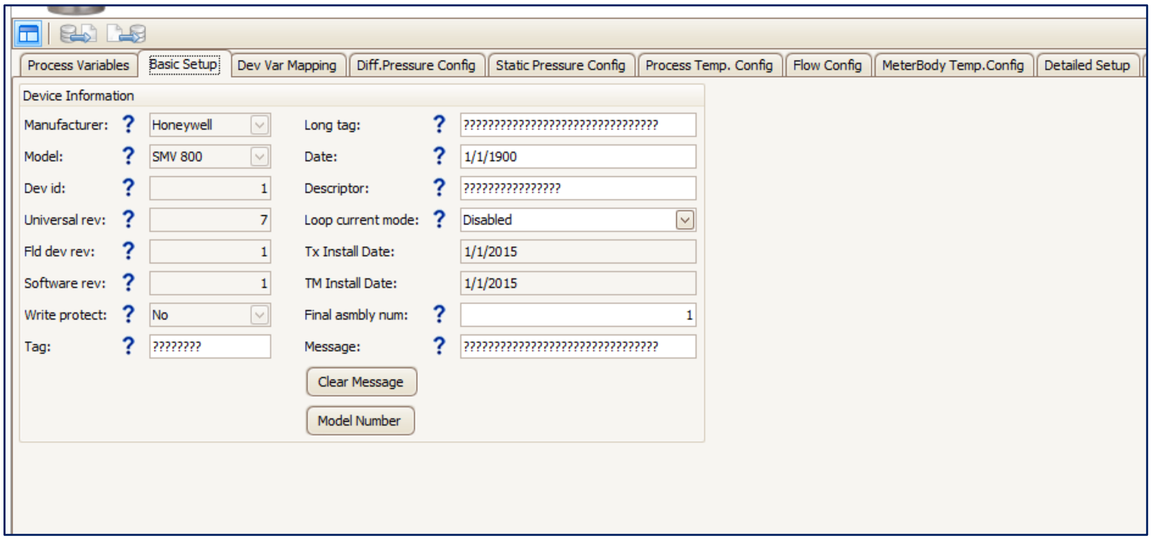


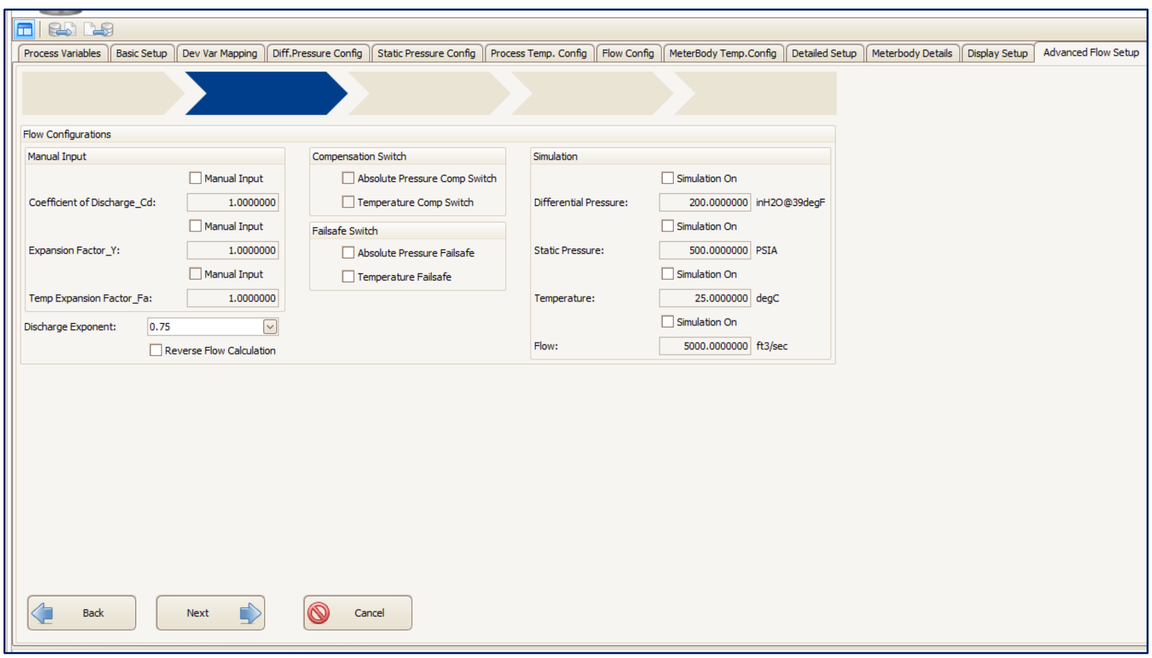
Refer “Device Configuration and Parameter Descriptions “ for more details.

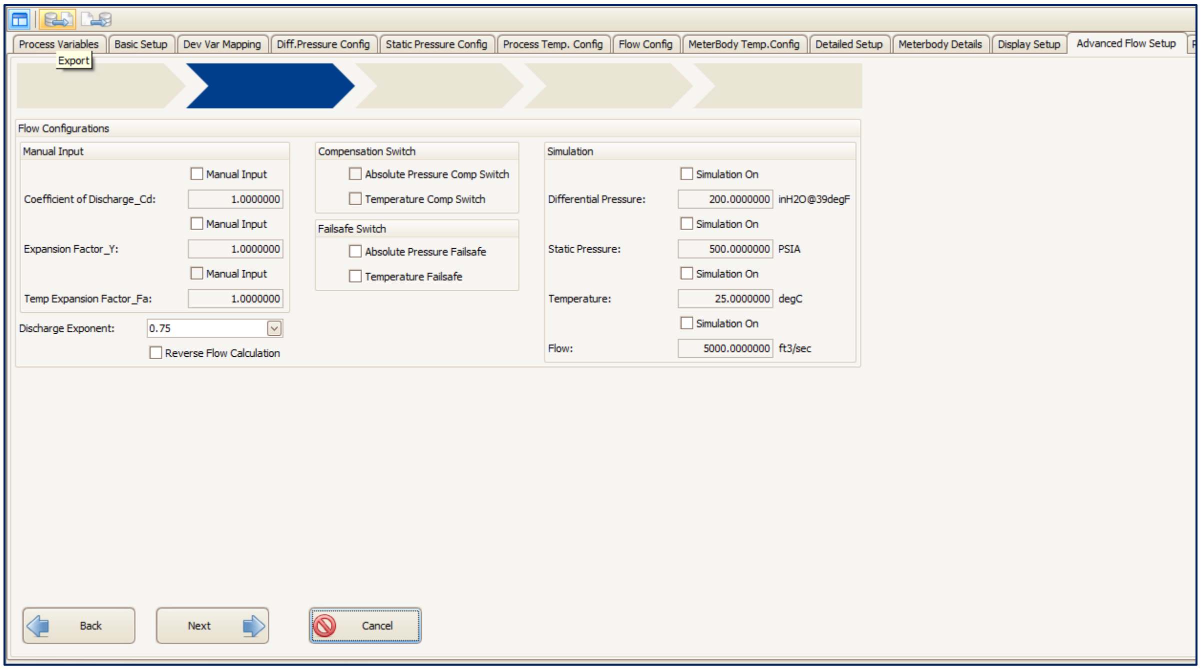
Refer Table 35 for more details

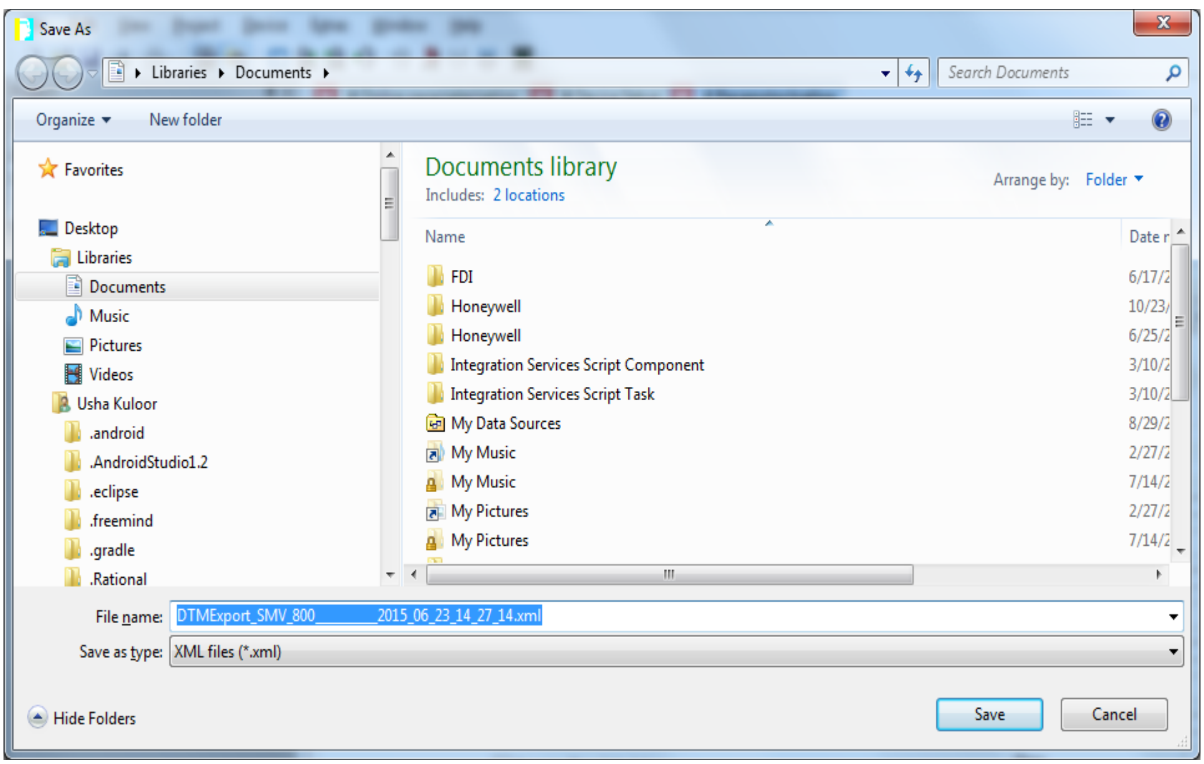
11.25 Saving the current Online Configuration as Offline dataset

While the in Offline parameterization select Load From Device from the Menu. All the current online parameter values will be set to the Offline dataset. User can export the parameters to an xml file. User can also edit the parameters before exporting to the file.





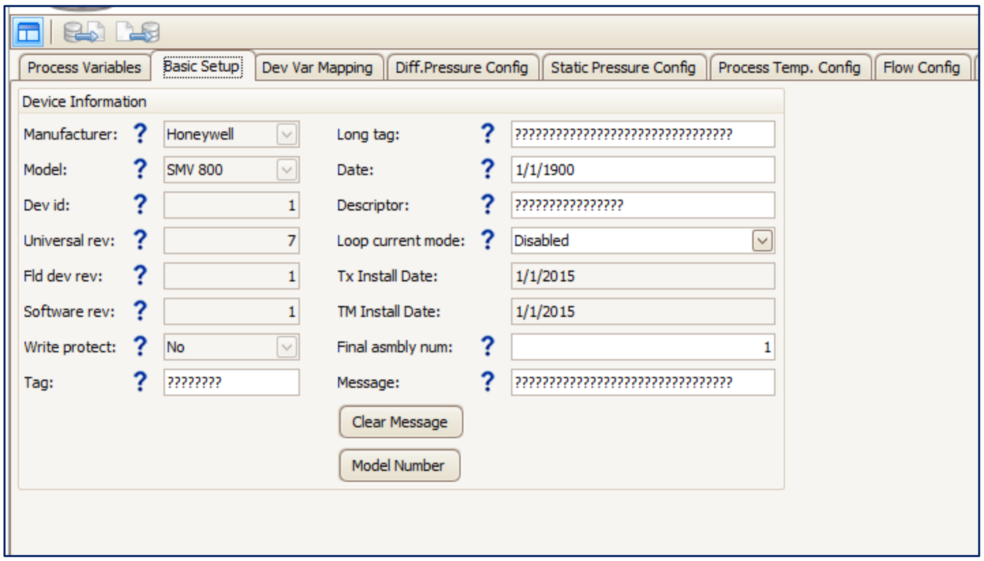

Process Variables
Basic Setup
Dev Var Mapping
Diff.Pressure Config
Static Pressure Config
Process Temp. Config
Flow Config
MeterBody Temp.Config
Detailed Setup
Meterbody Details
Display Setup
Advanced Flow Setup
Export
Flow Configurations
Manual Input
Manual Input
Coefficient of Discharge_Cd:
1.0000000
Manual Input
Expansion Factor_Y:
1.0000000
Manual Input
Temp Expansion Factor_Fa:
1.0000000
Discharge Exponent:
0.75
Reverse Flow Calculation
Compensation Switch
Absolute Pressure Comp Switch
Temperature Comp Switch
Failsafe Switch
Absolute Pressure Failsafe
Temperature Failsafe
Simulation
Simulation On
Differential Pressure:
200.0000000
inH2O@39degF
Simulation On
Static Pressure:
500.0000000
PSIA
Simulation On
Temperature:
25.0000000
degC
Simulation On
Flow:
5000.0000000
ft3/sec
Back
Next
Cancel


Save As
Libraries ▸ Documents ▸
Search Documents
Organize
New folder
Favorites
Desktop
Libraries
Documents
Music
Pictures
Videos
Usha Kuloor
.android
.AndroidStudio1.2
.eclipse
.freemind
.gradle
.Rational
Documents library
Includes: 2 locations
Arrange by: Folder
Name
FDI
Honeywell
Honeywell
Integration Services Script Component
Integration Services Script Task
My Data Sources
My Music
My Music
My Pictures
My Pictures
File name:
DTMExport_SMV_800_______2015_06_23_14_27_14.xml
Save as type:
XML files (*.xml)
Hide Folders
Save
Cancel

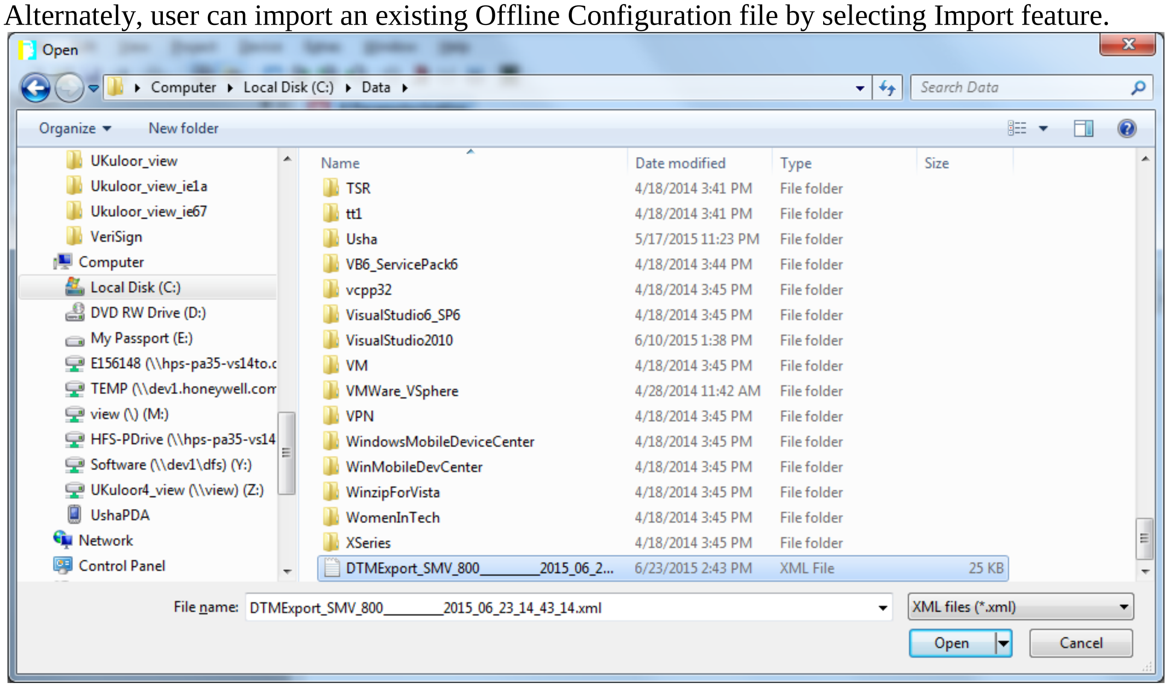
11.26 SMV 800 Offline Parameterization

On selecting Parameter/ Parameterization, the Offline parameter configuration page will be displayed. User can start with a new Offline Configuration from scratch or open the existing Offline Configuration file. Select Parameter/Parameterization.

All the offline configuration tabs are shown below. User can create his configuration and then can save the configuration to an xml file by selecting Export.



Alternately, user can import an existing Offline Configuration file by selecting Import feature.



12. HART DD binary file format compatibility matrix

"Host - SMV 800 - HART DD binary file format" compatibility matrix	
Host	DD file format to be used
Experion R410	Fm8
Experion R400 to R300	Fm6
Experion below R300	fms
FDM R440 and above	Fm8

Refer the respective Tools' User Manual for details on loading the DD file on these Tools.

13 Security

13.1 How to report a security vulnerability

For the purpose of submission, security vulnerability is defined as a software defect or weakness that can be exploited to reduce the operational or security capabilities of the software or device.
Honeywell investigates all reports of security vulnerabilities affecting Honeywell products and services.
To report potential security vulnerability against any Honeywell product, please follow the instructions at:
https://honeywell.com/pages/vulnerabilityreporting.aspx
Submit the requested information to Honeywell using one of the following methods:

- • Send an email to security@honeywell.com.

  or

- Contact your local Honeywell Process Solutions Customer Contact Centre (CCC) or Honeywell Technical Assistance Centre (TAC) listed in the "Support and Contact information" section of this document.

14 Troubleshooting

14.1 Diagnostic Messages for DE transmitters

Diagnostic Messages The diagnostic text messages that can be displayed on the SCT, SFC or on a TPS/TDC system are listed in the following tables. A description of the probable cause and suggested action to be taken are listed also to help in troubleshooting error conditions.

The messages are grouped in tables according to the status message categories.

Table 62 - Lists Critical status diagnostic messages
Table 63 - Non-Critical Status Diagnostic Message Table
Table 64 - Communication Status Message Table
Table 65 - Information Message Table
Table 66 - SFC Diagnostic Message Table

Diagnostic Message column provides the location of the SMV status. If you are using one of the diagnostic tools (SCT, SFC or Universal Station) that contains an earlier software version, you may see the diagnostic messages displayed as these SMV Status numbers.

The **SCT Status Message** column shows the text which appears in the Status tab window when the SCT is in the on-line mode and connected to the SMV control loop.

The **SFC Display Message** column shows the text which appears when the SFC is connected to the SMV control loop and the [STAT] key is pressed.

TDC Display Status Message column shows the text which appears on a TPS/TDC Universal Station.

Some messages and information in the tables are specific to the SCT or SFC and are noted.

DE Diagnostic Messages,
continued

Table 62 - Critical Status Diagnostic Message Table

SMV Status	**SCT Status Message**	SFC Display Message	TDC Status Message	Possible Cause	**What to Do**
7-0	A/D Failure PV3	STATUS *TAG ID.#* A/D FAILURE PV3	A/D FAILURE PV3	A/D circuit for PV3 input has failed.	• Cycle transmitter power OFF/ON. • Replace electronics module.
7-1	Characterization Fault PV3	STATUS *TAG ID.#* CHAR. FAULT PV3	CHAR. FAULT PV3	Characterization data for PV3 is bad.	• Cycle transmitter power OFF/ON. • Replace electronics module.
1-1	Characterization PROM Fault or Bad Checksum	STATUS *TAG ID.* CHAR PROM FAULT	CHAR PROM FAULT	Characterization data is bad.	Replace PROM with an identical PROM. Verify PROM serial number: SCT – Select Device tab card. SFC – Press **[CONF]** and [σ **NEXT]**
1-3	DAC Compensation Fault Error Detected	STATUS *TAG ID.#* DAC COMP FAULT	DAC COMP FAULT	DAC temperature compensation is out of range.	Replace electronics module.
1-4	NVM Fault PV1	STATUS *TAG ID.#* NVM FAULT	NVM FAULT	PV1 nonvolatile memory fault.	Replace electronics module.
1-5	RAM Fault	STATUS *TAG ID.* RAM FAULT	RAM FAULT	RAM has failed	Replace electronics module
1-6	PROM Fault	STATUS *TAG ID.* PROM FAULT	PROM FAULT	PROM has failed.	Replace PROM.
1-7	PAC Fault	STATUS *TAG ID.* PAC FAULT	PAC FAULT	PAC circuit has failed.	Replace electronics module.

Continued on next page

DE Diagnostic Messages, continued

Critical Status Diagnostic Message Table , Continued

SMV Status	SCT Status Message	SFC Display Message	TDC Status Message	Possible Cause	What to Do
2-4 2-5	Meter Body Overload OR Meter Body Fault: Pressure >2*URL	STATUS *TAG ID.#* M. B. OVERLOAD OR STATUS *TAG ID.#* METERBODY FAULT	M. B. OVERLOAD OR METER BODY FAULT	Pressure input is two times greater than URL for PV2.	• Wait for PV2 range to return to normal. • Meter body may have been damaged. Check the transmitter for accuracy and linearity. Replace meter body center and recalibrate if needed.
8-3	Input Open PV3	STATUS *TAG ID.* INPUT OPEN PV3	INPUT OPEN PV3	Temperature input TC or RTD is open.	Replace the thermocouple or RTD.
1-2	Input Suspect	OUTP 1 *TAG ID.* SUSPECT INPUT	SUSPECT INPUT	PV1 or sensor temperature input data seems wrong. Could be a process problem, but it could also be a meter body or electronics module problem.	• Cycle transmitter power OFF/ON. • Put transmitter in PV1 output mode check transmitter status. Diagnostic messages should identify where problem is. If no other diagnostic message is given, condition is most likely meter body related. • Check installation and replace meter body center section. If condition persists, replace electronics module.
3-1	Input Suspect PV2	OUTP 1 *TAG ID.* SUSPCT INPUT PV2	SUSPCT INPUT PV2	PV2 Input data seems wrong. Could be a process problem, but it could also be a meter body or electronics module problem.	• Cycle transmitter power OFF/ON. • Put transmitter in PV2 output mode and check transmitter status. Diagnostic messages should identify where problem is. If no other diagnostic message is given, condition is most likely meter body related. • Check installation and replace meter body center section. If condition persists, replace electronics module.

DE Diagnostic Messages,
ontinued

Critical Status Diagnostic Message Table , Continued

SMV Status	SCT Status Message	SFC Display Message	TDC Status Message	Possible Cause	What to Do
7-2	Input Suspect PV3	OUTP 1 *TAG ID.* SUSPCT INPUT PV3	-	PV3 Input data seems wrong. Sensor reading is extremely erratic. Could be a process problem, but it could also be a temperature sensor or electronics module problem. The temperature sensor board is in the Terminal block	• Cycle transmitter power OFF/ON. • Check sensor leads for weak area that may be ready to break or loose connection.
3-0	Invalid Database	*TAG NO.* INVALID DATABASE	INVALID DATABASE	Transmitter database was incorrect at power-up.	• Try communicating again. • Verify database configuration, and then manually update non-volatile memory.
7-4	NVM Fault PV3	STATUS *TAG ID.* NVM FAULT PV3	NVM FAULT PV3	PV3 nonvolatile memory fault.	Replace electronics module.
8-4	Over Range PV3	STATUS *TAG ID.* OVERRANGE PV3	OVERRANGE PV3	Process temperature exceeds PV3 range.	• Check process temperature. Reduce temperature, if required. • Replace temperature sensor, if needed.
9-0	PV4 (Flow) Algorithm Parameters Invalid	STATUS *TAG ID.#* ALGPARM INVALID	STATUS 9- 0	Configuration for selected equation is not complete.	Check the flow configuration using the SCT flow compensation wizard.
3-3	PV4 in failsafe	-	STATUS 3- 3	An algorithm diagnostic has determined the flow to be invalid.	• Resolve the conditions causing the other diagnostic message. • Check all flow configuration parameters.

Continued on next page

DE Diagnostic Messages,
continued

Table 63 - Non-Critical Status Diagnostic Message Table

SMV Status	SCT Status Message	SFC Display Message	TDC Status Message	Possible Cause	What to Do
9-3	Bad AP Compensation PV4	STATUS *TAG ID.#* BAD AP COMP PV4	BAD AP COMP PV4	Problem with absolute/gauge pressure input PV2 or input processing circuitry for PV2.	• Verify that absolute/gauge pressure input is correct for selected flow equation. • If error persists, replace transmitter.
9-4	Bad PT Compensation PV4	STATUS *TAG ID.#* BAD PT COMP PV4	BAD PT COMP PV4	Problem with process temperature input PV3, input processing circuitry for PV3, or PV4 algorithm parameter data.	• Verify that process temperature input is correct. • Verify open/defective temperature sensor. • Correct process temperature measurement. • Check for temperature limits exceeded in viscosity or density configuration. • Check design temperature value for PV4 standard gas algorithm.
2-6	Corrects Reset PV1	STATUS *TAG ID.#* CORRECTS RST PV1	CORRECTS RST PV1	All calibration "CORRECTS" were deleted and data was reset for PV1 range.	Recalibrate PV1 (DP) range.
4-6	Corrects Reset PV2	STATUS *TAG ID.#* CORRECTS RST PV2	CORRECTS RST PV2	All calibration "CORRECTS" were deleted and data was reset.	Recalibrate PV2 (SP) range.
8-6	Corrects Active on PV3	STATUS *TAG ID.#* CORR. ACTIVE PV3	CORR. ACTIVE PV3	Process temperature PV3 has been calibrated and is now different than factory default (uncalibrated).	Nothing – or do a reset corrects

DE Diagnostic Messages, continued

Non-Critical Status Diagnostic Message Table , continued

SMV Status	SCT Status Message	SFC Display Message	TDC Status Message	Possible Cause	What to Do
3-6	Density temperature or pressure out of range	-	STATUS 3- 6	Either the temperature (PV3) or the pressure (PV2) is not within the boundaries of SMV steam equation. The SMV steam equation is defined for pressures between 8 and 3000 psia, and temperature between saturation and 1500 °F, except above 2000 psia.	Check to see if the PV measurement is correct.
2-2	Excess Span Correct PV1 Or S p an Correction is Out of Limits	STATUS *TAG ID.#* EX . SPAN COR PV1	EX. SPAN COR PV1	SPAN correction factor is outside acceptable limits for PV1 range. Could be that transmitter was in input or output mode during a CORRECT procedure.	• Verify calibration. • If error persists, call the Solutions Support Center
4-2	Excess Span Correct PV2	STATUS *TAG ID.#* EX. SPAN COR PV2	EX. SPAN COR PV2	SPAN correction factor is outside acceptable limits for PV2 range. Could be that transmitter was in input or output mode during a CORRECT procedure.	• Verify calibration. • If error persists, call the Solutions Support Center
8-2	Excess Span Correct PV3	STATUS *TAG ID.#* EX. SPAN COR PV3	EX. SPAN COR PV3	SPAN correction factor is outside acceptable limits for PV3 range.	• Verify calibration. • If error persists, call the Solutions Support Center

DE Diagnostic Messages, continued

Non-Critical Status Diagnostic Message Table , continued

SMV Status	SCT Status Message	SFC Display Message	TDC Status Message	Possible Cause	What to Do
2-1	Excess Zero Correct PV1 Or Zero Correction is Out of Limits	STATUS *TAG ID.#* EX . ZERO COR PV1	EX . ZERO COR PV1	ZERO correction factor is outside acceptable limits for PV1 range. Could be that transmitter was in input or output mode during a CORRECT procedure.	• Verify calibration. • If error persists, call the Solutions Support Center
4-1	Excess Zero Correct PV2	STATUS *TAG ID.#* EX . ZERO COR PV2	EX . ZERO COR PV2	ZERO correction factor is outside acceptable limits for PV2 range. Could be that transmitter was in input or output mode during a CORRECT procedure.	• Verify calibration. • If error persists, call the Solutions Support Center
8-1	Excess Zero Correct PV3	STATUS *TAG ID.#* EX . ZERO COR PV3	EX . ZERO COR PV3	ZERO correction factor is outside acceptable limits for PV3 range.	• Verify calibration. • If error persists, call the Solutions Support Center
9-5	In Cutoff PV4	STATUS *TAG ID.#* IN CUTOFF PV4	IN CUTOFF PV4	Calculated flow rate is within configured low and high limits for PV4 low flow cutoff.	Nothing – wait for flow rate to exceed configured high limit. Verify that flow rate is in cutoff.
5-4	Input Mode PV1 (DP)	STATUS *TAG ID.#* INPUT MODE PV1	INPUT MODE PV1	Transmitter is simulating input for PV1.	Exit Input mode: SCT – Press “Clear Input Mode” button on the DP InCal tab. SFC – Press [SHIFT], [INPUT], and [CLR] keys.

DE Diagnostic Messages, continued

Non-Critical Status Diagnostic Message Table , continued

SMV Status	SCT Status Message	SFC Display Message	TDC Status Message	Possible Cause	What to Do
5-5	Input Mode PV2 (AP)	STATUS *TAG ID.#* INPUT MODE PV2	INPUT MODE PV2	Transmitter is simulating input for PV2.	Exit Input mode: SCT – Press “Clear Input Mode” button on the AP InCal tab. SFC – Press [SHIFT], [INPUT], and [CLR] keys.
5-6	Input Mode PV3 (Temp)	STATUS *TAG ID.#* INPUT MODE PV3	INPUT MODE PV3	Transmitter is simulating input for PV3.	Exit Input mode: SCT – Press “Clear Input Mode” button on the TEMP InCal tab. SFC – Press [SHIFT], [INPUT], and [CLR] keys.
5-7	Input Mode PV4 (Flow)	STATUS *TAG ID.#* INPUT MODE PV4	INPUT MODE PV4	Transmitter is simulating input for PV4.	Exit Input mode: SCT – Press “Clear Input Mode” button on the FLOW InCal tab. SFC – Press [SHIFT], [INPUT], and [CLR] keys.
2-0	Meter Body Sensor Over Temperature	STATUS *TAG ID.#* M. B. OVERTEMP	M. B. OVERTEMP	Sensor temperature is too high (>125 °C). Accuracy and life span may decrease if it remains high.	Take steps to insulate meter body from temperature source.
2-7	No DAC Temp Comp Or DAC Temperature Compensation data is corrupt	STATUS *TAG ID.#* NO DAC TEMPCOMP	NO DAC TEMP COMP	Failed DAC.	Replace electronics module.

Non-Critical Status Diagnostic Message Table , Continued

SMV Status	SCT Status Message	SFC Display Message	TDC Status Message	Possible Cause	What to Do
6-4	Output Mode PV1 (DP)	STATUS *TAG ID.#* OUTPUT MODE PV1	OUTPUT MODE PV1	Analog transmitter is operating as a current source for PV1 output.	Exit Output Mode: SCT – Press “Clear Output Mode” button on the DP OutCal tab. SFC – Press [OUTPUT] and [CLR] keys.
6-5	Output Mode PV2 (SP)	STATUS *TAG ID.#* OUTPUT MODE PV2	OUTPUT MODE PV2	Analog transmitter is operating as a current source for PV2 output.	Exit Output Mode: SCT – Press “Clear Output Mode” button on the AP OutCal tab. SFC – Press [OUTPUT] and [CLR] keys.
6-6	Output Mode PV3 (Temp)	STATUS *TAG ID #* OUTPUT MODE PV3	OUTPUT MODE PV3	Analog transmitter is operating as a current source for PV3 output.	Exit Output Mode: SCT – Press “Clear Output Mode” button on the TEMP OutCal tab. SFC – Press [OUTPUT] and [CLR] keys.
6-7	Output Mode PV4 (Flow)	STATUS *TAG ID.#* OUTPUT MODE PV4	OUTPUT MODE PV4	Analog transmitter is operating as a current source for PV4 output.	Exit Output Mode: SCT – Press “Clear Output Mode” button on the FLOW OutCal tab. SFC – Press [OUTPUT] and [CLR] keys.
3-7	PV4 Independent variable out of range	-	STATUS 3- 7	For R250 Laminar Flow transmitters only. Asserted when a PV is not within the range of a term in the laminar Flow equation.	• Check the value of every PV against the ranges in the Laminar Flow equation. • Redefine the equation, if necessary.

DE Diagnostic Messages, continued

Non-Critical Status Diagnostic Message Table , Continued

SMV Status	SCT Status Message	SFC Display Message	TDC Status Message	Possible Cause	What to Do
9-7	Reynolds Number is Out of Range	-	STATUS 9-7	The high or low Reynolds number limit was exceeded.	• Verify high or low Reynolds number limit. • Calculate Reynolds number for flow conditions causing the message.
8-7	Sensor Mismatch PV3	SAVE/RESTORE TYPE MI SMATCH	SNSR MISMTCH PV3	Number of wires selected does not match number of sensor wires physically connected to the transmitter.	Check sensor wiring and type.

DE Diagnostic Messages,

Table 64 - Communication Status Message Table

SMV Status	SCT Status Message	SFC Display Message	TDC Status Message	Possible Cause	What to Do
-	Command Aborted	*TAG NO.* COMM ABORTED	-	Communications aborted. SFC – Pressed [CLR] key during communications operation.	Retry aborted operation.
-	Communication Error Upload failed	*TAG NO.* END AROUND ERR	-	Communications unsuccessful.	• Check loop wiring and STC/SFC connections. • If error persists, replace transmitter electronics module.
-	Download Failed	SAVE/RESTORE RESTORE FAILED	-	Database restore or download function failed due to a problem with the current configuration or a communications error.	Check transmitter and try again.
-	Invalid Response	*TAG NO.* ILLEGAL RESPONSE	-	The transmitter did not respond properly since the response was not recognizable. The message was probably corrupted by external influences. Transmitter sent illegal response to SCT or SFC.	Try communicating again.
-	Illegal operation	URV 3. *TAG ID.* INVALID REQUEST	-	Requesting transmitter to correct or set its URV to a value that results in too small a span, or correct its LRV or URV while in input or output mode.	• Check that correct URV calibration pressure is being applied to transmitter, or that transmitter is not in input or output mode.
				SFC – Keystroke is not valid for given transmitter.	Check that keystroke is applicable
				SCT – The requested transaction is not supported by the transmitter.	Make sure the device version is compatible with the currentrelease of the SCT 3000.

DE Diagnostic Messages, continued

Communication Status Message Table , continued

SMV Status	SCT Status Message	SFC Display Message	TDC Status Message	Possible Cause	What to Do
-	-	STATUS *TAG ID.* NACK RESPONSE	-	Transmitter sent a negative response because it could not process one or more commands.	Check configuration and try again.
-	-	*TAG NO.* FAILED COMM CHK	-	SFC failed a communications diagnostic check. Could be an SFC electronic problem or a faulty or dead communication loop.	• Check polarity and try again. • Press [stat] key and do any corrective action required and try again. • Check communication loop. • Replace SFC.
-	-	*TAG NO.* HI RES/LO VOLT	-	Either there is too much resistance in loop (open circuit), voltage is too low, or both.	• Check polarity, wiring, and power supply. There must be 11 volts minimum at transmitter to permit operation. • Check for defective or misapplied capacitive or inductive devices (filters).
-	-	*TAG NO.* NO XMTR RESPONSE	-	No response from transmitter. Could be transmitter or loop failure.	• Try communicating again. • Check that transmitter's loop integrity has been maintained, that SCT or SFC is connected properly, and that loop resistance is at least 250Ù. SCT – Select Tag ID from the View pull down menu. SFC – Press **[ID]** key and do any corrective action required and try again.

DE Diagnostic Messages, continued

Table 65 - Information Message Table

SMV Status	SCT Status Message	SFC Display Message	TDC Status Message	Possible Cause	What to Do
6-3	2 Wire TC PV3	STATUS TAG ID. 2 WIRE TC PV3	2 WIRE TC PV3	PV3 input is being provided by 2-wire Thermocouple (T/C) type.	Nothing – Information only. However, this may indicate a problem if sensor type does not match the sensor physically connected to transmitter.
6-0	2 Wire RTD PV3	STATUS TAG ID. 2 WIRE RTD PV3	2 WIRE RTD PV3	PV3 input is being provided by 2-wire RTD type.	Nothing – Information only. However, this may indicate a problem if number of wires displayed does not match number of RTD leads physically connected to transmitter; or if sensor
6-1	3 Wire RTD PV3	STATUS TAG ID. 3 WIRE RTD PV3	3 WIRE RTD PV3	PV3 input is being provided by 3-wire RTD type.	Nothing – Information only. However, this may indicate a problem if number of wires displayed does not match number of RTD leads physically connected to transmitter; or if sensor
6-2	4 Wire RTD PV3	STATUS TAG ID. 4 WIRE RTD PV3	4 WIRE RTD PV3	PV3 input is being provided by 4-wire RTD type.	Nothing – Information only. However, this may indicate a problem if number of wires displayed does not match number of RTD leads physically connected to transmitter; or if sensor
4-3	PV2 Sensor = AP	-	STATUS 4- 3	Sensor type for the current SMV is absolute pressure.	Nothing – Information only.
4-4	PV2 Sensor = GP	-	STATUS 4-4	Sensor type for the current SMV is gauge pressure.	Nothing – Information only.
-	Write Protected	URV 1 . TAG ID . WRITE PROTECTED	-	The value could not be written because the transmitter is write protected.	The hardware jumper within the device must be repositioned in order to permit write operations.

DE Diagnostic Messages, continued

Table 66 - SFC Diagnostic Message Table

SMV Status	SCT Status Message	SFC Display Message	TDC Status Message	Possible Cause	What to Do
-	-	ALGPARM Kuser >RANGE	-	Applicable PV4 algorithm parameter is set to default value of not-a-number (NaN).	Enter and download desired value to transmitter database.
-	-	SAVE/RESTORE H. W. MI SMATCH	-	Hardware mismatch. Part of Save/Restore function.	None – SFC tried to restore as much of database as possible.
-	-	STATUS *TAG ID.* NVM ON SEE MAN	-	SFC's CPU is misconfigured.	Replace SFC.
-	-	SAVE/RESTORE OPTION MISMATCH	-	On a database restore, one or more options do not match.	None – SFC tried to restore as much of database as possible.
-	-	STATUS *TAG ID.* UNKNOWN	-	Selection is unknown.	Be sure SFC software is latest version.
-	-	*TAG NO.* LOW LOOP RES	-	Not enough resistance in series with communication loop.	Check sensing resistor and increase resistance to at least 250Ù.
-	-	TAG NO. SFC FAULT	-	SFC is operating incorrectly.	Try communicating again. If error still exists, replace SFC.
-	-	URV 1 . *TAG ID.* >RANGE "H20 _39F	-	SFC – Value calculation is greater than display range. SCT – The entered value is not within the valid range.	SFC – Press **[CLR]** key and start again. Be sure special units conversion factor is not greater than display range. SCT – Enter a value within the range.

Appendix A. **Custom Configuration sheets**

For detailed information on configuration dependencies please refer to 34-SM-00-06 on the CD or can be located on our web site at: https://www.honeywellprocess.com/en-US/explore/products/instrumentation/pressure-transmitters/smart-multivariable-transmitters/Pages/default.aspx

SMV800 HART Configuration

Default selections are in **boldface**.

SMV800 Model Key	SMA810 ___	SMA845 ___	SMG870 ___			
Honeywell S.O. Number	________					
General Configuration						
Message	______________________________					
Polling Address	____					
Loop Current Mode	**Enabled** ___	Disabled ___				
NAMUR Output	Enabled ___	**Disabled** ___				
Write Protection	Enabled ___	**Disabled** ___				
Tag	________					
Descriptor	_______________					
Long Tag	______________________________					
HART PV	**Differential Pressure** ___	Static Pressure ___	Process Temperature ___	Flow ___		
HART SV	Differential Pressure ___	**Static Pressure** ___	Process Temperature ___	Flow ___	Meter Body Temperature ___	
HART TV	Differential Pressure ___	Static Pressure ___	**Process Temperature** ___	Flow ___	Meter Body Temperature ___	
HART QV	Differential Pressure ___	Static Pressure ___	Process Temperature ___	**Flow** ___	Meter Body Temperature ___	
Loop Output Source	Differential Pressure ___	Static Pressure ___	Process Temperature ___	**Flow** ___		
Failsafe Direction	**Upscale** ___	Downscale ___				
Differential Pressure (DP) Configuration						
DP Engineering Unit	**inH_2O @ 39.2°F** ___	mmH_2O @ 4°C ___	Torr ___	inH_2O @ 68°F ___	mmHg @ 0°C ___	kgf/cm^2 ___
	inH_2O @ 60°F ___	mmH_2O @ 68°F ___	gf/cm^2 ___	ftH_2O @ 68°F ___	bar ___	Pa ___
	inHg @ 0°C ___	mbar ___	kPa ___	psi ___	atm ___	MPa ___
DP Lower Range Value	_________					
DP Upper Range Value	_________					
DP Damping (sec)	______					
Static Pressure (SP) Configuration						
SP Engineering Unit	**psi** ___	mmH_2O @ 4°C ___	Torr ___	inH_2O @ 68°F ___	mmHg @ 0°C ___	kgf/cm^2 ___
	inH_2O @ 60°F ___	mmH_2O @ 68°F ___	gf/cm^2 ___	ftH_2O @ 68°F ___	bar ___	Pa ___
	inHg @ 0°C ___	mbar ___	kPa ___	inH_2O @ 39.2°F ___	atm ___	MPa ___
SP Lower Range Value	_________					
SP Upper Range Value	_________					
SP Damping (sec)	______					

Process Temperature (PT) Configuration

PT Sensor Type	**TC Type E** ___	TC Type N ___	TC Type R ___	RTD Pt25 ___	RTD Pt500 ___
	TC Type J ___	TC Type T ___	TC Type B ___	RTD Pt100 ___	RTD Pt1000 ___
	TC Type K ___	TC Type S ___		RTD Pt200 ___	
PT Engineering Unit	**°C** ___	°F ___	°R ___	K ___	
PT Lower Range Value	__________				
PT Upper Range Value	__________				
PT Damping (sec)	_______				
PT TC/RTD Fault Detection	**On** ___	Off ___			
PT Fault Detect Latching	**On** ___	Off ___			
PT Cold Junction Type	**Internal** ___	External ___	Fixed ___		
PT Fixed Cold Junction Temperature (°C)	________				

Flow Configuration

Flow URL							
Flow URV							
Flow LRV	_________						
Flow Output Type	No Flow Output ___	Ideal Gas Volume Flow at Standard Condition ___	Liquid Mass Flow ___	Laminar Mass Flow ___			
	Ideal Gas Actual Volume Flow ___	Steam Mass Flow ___	Liquid Actual Volume Flow ___	Laminar Actual Volume Flow ___			
	Ideal Gas Mass Flow ___		Liquid Volume Flow at Standard Condition ___	Laminar Volume Flow @ Standard Condition ___			
Volume Flow Engineering Unit	**ft^3/sec** ___	ft^3/h ___	m^3/sec ___	bbl/day ___	gal/h ___	m^3/h ___	l/h ___
	ft^3/min ___	gal/day ___	m^3/day ___	gal/min ___	m^3/min ___	l/min ___	
Mass Flow Engineering Unit	**lb/sec** ___	g/min ___	kg/h ___	lb/h ___	kg/sec ___	t/h ___	
	lb/min ___	g/h ___	t/min ___	g/sec ___	kg/min ___		
Flow K_{user} Factor	_________						
Flow Calibration Factor	_________						
Low Flow Cutoff	**On** ___	Off ___					
Low Flow Cutoff Low Limit (%)	_________						
Low Flow Cutoff High Limit (%)	_________						
PV1 Simulation	On ___	**Off** ___					
PV1 Simulated Value (inH2O @ 39.2°F)	_________						
PV2 Simulation	On ___	**Off** ___					
PV2 Simulated Value (psi)	_________						
PV3 Simulation	On ___	**Off** ___					
PV3 Simulated Value (°C)	_________						
PV4 Simulation	On ___	**Off** ___					
PV4 Simulated Value (in ft3/sec when Volume Flow, lb/sec when Mass Flow. User selectable Volume/Mass units when using DTM)	_________						
PV2 Failsafe	On___	**Off** ___					
PV3 Failsafe	On___	**Off** ___					
Local Atmospheric Pressure (psi)	_________						
Algorithm Type	**SMV800 Method** ___	SMV3000 Method ___					
Fluid Type	**Gas** ___	Liquid ___	Superheated Steam ___	SP-Compensated Saturated Steam ___	PT-Compensated Saturated Steam ___		

Fluid Name	1,1,2,2-TETRAFLUOROETHANE ___	1-OCTENE ___	CARBON TETRACHLORIDE ___	ISOBUTANE ___	NITRIC ACID ___
	1,1,2-TRICHLOROETHANE ___	1-PENTADECANOL ___	CHLORINE ___	ISOPRENE ___	NITRIC OXIDE ___
	1,2,4-TRICHLOROBENZENE	1-PENTANOL ___	CHLOROPRENE ___	ISOPROPANOL ___	NITROBENZENE ___
	1,2-BUTADIENE ___	1-PENTENE ___	CHLOROTRIFLUOROETHYLENE ___	m-CHLORONITROBENZENE ___	NITROETHANE ___
	1,3,5-TRICHLOROBENZENE ___	1-UNDECANOL ___	CYCLOHEPTANE ___	m-DICHLOROBENZENE ___	NITROGEN ___
	1,4-DIOXANE ___	2,2-DIMETHYLBUTANE ___	CYCLOHEXANE ___	METHANE ___	NITROMETHANE ___
	1,4-HEXADIENE ___	2-METHYL-1-PENTENE ___	CYCLOPENTENE ___	METHANOL	NITROUS OXIDE ___
	1-BUTANAL ___	ACETIC ACID ___	CYCLOPROPANE ___	METHYL ACRYLATE ___	OXYGEN ___
	1-BUTANOL ___	ACETONE ___	ETHANE ___	METHYL ETHYL KETONE ___	PENTAFLUOROETHANE ___
	1-BUTENE ___	ACETONITRILE ___	ETHANOL ___	METHYL VINYL ETHER ___	PHENOL ___
	1-DECANAL ___	ACETYLENE ___	ETHYLAMINE ___	n-BUTANE ___	PROPADIENE ___
	1-DECANOL ___	ACRYLONITRILE ___	ETHYLBENZENE ___	n-BUTYRONITRILE ___	PROPANE ___
	1-DECENE ___	AIR ___	ETHYLENE OXIDE ___	n-DECANE ___	PROPYLENE ___
	1-DODECANOL ___	ALLYL ALCOHOL ___	ETHYLENE ___	n-DODECANE ___	PYRENE ___
	1-DODECENE ___	AMMONIA ___	FLUORENE ___	n-HEPTADECANE ___	STYRENE ___
	1-HEPTANOL ___	ARGON ___	FURAN ___	n-HEPTANE ___	SULFUR DIOXIDE ___
	1-HEPTENE ___	BENZALDEHYDE ___	HELIUM-4 ___	n-HEXANE ___	TOLUENE ___
	1-HEXADECANOL ___	BENZENE ___	HYDROGEN CHLORIDE ___	n-OCTANE ___	TRICHLOROETHYLENE ___
	1-HEXENE ___	BENZYL ALCOHOL ___	HYDROGEN CYANIDE ___	n-PENTANE ___	VINYL CHLORIDE ___
	1-NONANAL ___	BIPHENYL ___	HYDROGEN PEROXIDE ___	METHANE ___	WATER ___
	1-NONANOL ___	CARBON DIOXIDE ___	HYDROGEN SULFIDE ___	NEON ___	Custom Fluid ___
	1-OCTANOL ___	CARBON MONOXIDE ___	HYDROGEN ___	NEOPENTANE ___	

Custom Fluid Name	________________			
Compensation Mode	Standard ___	**Dynamic** ___		
Standard Flow Compensation	Absoute Pressure ___	Temperature ___		
Flow Calculation Standard	ASME-MFC-3 ___	Wedge ___		
	ASME-MFC-14M ___	Average Pitot Tube ___		
	ISO5167 ___	Integral Orifice ___		
	GOST ___	Conditional Orifice ___		
	AGA3 ___	Legacy SMV3000 ___		
	V-Cone/Wafer Cone ___			
Design Temperature (°F)	_________			
Design Absolute Pressure (psi)	_________			
Design Density (lb/ft^3)	_________			
Standard Density (lb/ft^3)	_________			
SMV3000 Primary Element Type	Orifice - Flange Taps (ASME-ISO) D >/= 2.3 inches ___	Venturi - Machined Inlet (ASME-ISO) ___	Leopold Venturi ___	
	Orifice - Flange Taps (ASME-ISO) 2 </= D </= 2.3 ___	Venturi - Rough Cast Inlet (ASME-ISO) ___	Gerand Venturi ___	
	Orifice - Corner Taps (ASME-ISO) ___	Venturi - Rough Welded Sheet-Iron Inlet (ASME-ISO) ___	Universal Venturi Tube ___	
	Orifice - D and D/2 Taps (ASME-ISO) ___	Nozzle (ASME Long Radius) ___	Low-Loss Venturi Tube ___	
	Orifice - 2.5D and 8D Taps (ASME-ISO) ___	Venturi Nozzle (ISA Inlet) ___	Preso Ellipse 0.875 inch for 2 inch Pipe	Preso Ellipse 1.25 inch for 28 inch Pipe
			Preso Ellipse 0.875 inch for 2.5 inch Pipe	Preso Ellipse 1.25 inch for 30 inch Pipe
			Preso Ellipse 0.875 inch for 3 inch Pipe	Preso Ellipse 1.25 inch for 32 inch Pipe
			Preso Ellipse 0.875 inch for 4 inch Pipe	Preso Ellipse 1.25 inch for 34 inch Pipe
			Preso Ellipse 0.875 inch for 5 inch Pipe	Preso Ellipse 1.25 inch for 36 inch Pipe
			Preso Ellipse 0.875 inch for 6 inch Pipe	Preso Ellipse 1.25 inch for 42 inch Pipe
			Preso Ellipse 0.875 inch for 8 inch Pipe	Preso Ellipse 1.25 inch for gt 42 inch Pipe
			Preso Ellipse 0.875 inch for 10 inch Pipe	Preso Ellipse 2.25 inch for 16 inch Pipe
			Preso Ellipse 0.875 inch for 12 inch Pipe	Preso Ellipse 2.25 inch for 18 inch Pipe
			Preso Ellipse 0.875 inch for 14 inch Pipe	Preso Ellipse 2.25 inch for 20 inch Pipe
			Preso Ellipse 1.25 inch for 12 inch Pipe	Preso Ellipse 2.25 inch for 22 inch Pipe
			Preso Ellipse 1.25 inch for 14 inch Pipe	Preso Ellipse 2.25 inch for 24 inch Pipe
			Preso Ellipse 1.25 inch for 16 inch Pipe	Preso Ellipse 2.25 inch for 26 inch Pipe
			Preso Ellipse 1.25 inch for 18 inch Pipe	Preso Ellipse 2.25 inch for 28 inch Pipe
			Preso Ellipse 1.25 inch for 20 inch Pipe	Preso Ellipse 2.25 inch for 30 inch Pipe
			Preso Ellipse 1.25 inch for 22 inch Pipe	Preso Ellipse 2.25 inch for 32 inch Pipe
			Preso Ellipse 1.25 inch for 24 inch Pipe	Preso Ellipse 2.25 inch for 34 inch Pipe
			Preso Ellipse 1.25 inch for 26 inch Pipe	Preso Ellipse 2.25 inch for 36 inch Pipe
				Preso Ellipse 2.25 inch for 42 inch Pipe
				Preso Ellipse 2.25 inch for gt 42 inch Pipe
				Other Pitot Tube
Primary Element Type	Orifice ASME-MFC-3-2004 Flange Pressure Taps ___	Conditional Orifice 405 ___	Venturi ASME-MFC-3-2004 Machined Convergent Section ___	
	Orifice ASME-MFC-3-2004 Corner Pressure Taps ___	Conditional Orifice 1595 Flange Pressure Taps ___	Venturi ASME-MFC-3-2004 Rough-Welded Convergent Section ___	
	Orifice ASME-MFC-3-2004 D and D/2 Pressure Taps ___	Conditional Orifice 1595 Corner Pressure Taps ___	Venturi ISO5167-2003 "As-Cast" Convergent Section ___	
	Orifice ISO5167-2003 Flange Pressure Taps ___	Conditional Orifice 1595 D and D/2 Flange Pressure Taps ___	Venturi ISO5167-2003 Machined Convergent Section ___	
	Orifice ISO5167-2003 Corner Pressure Taps ___	Nozzle ASME-MFC-3-2004 ASME Long Radius ___	Venturi ISO5167-2003 Rough-Welded Sheet-Iron Convergent Section ___	
	Orifice ISO5167-2003 D and D/2 Pressure Taps ___	Nozzle ASME-MFC-3-2004 Venturi ___	Venturi GOST 8.586-2005 Cast Upstream Cone Part ___	
	Orifice GOST 8.586-2005 Flange Pressure Taps ___	Nozzle ASME-MFC-3-2004 ISA 1932 ___	Venturi GOST 8.586-2005 Machined Upstream Cone Part ___	
	Orifice GOST 8.586-2005 Corner Pressure Taps ___	Nozzle ISO5167-2003 Long Radius ___	Venturi GOST 8.586-2005 Welded Upstream Cone Part made of Sheet Steel ___	
	Orifice GOST 8.586-2005 Three-Radius Pressure Taps ___	Nozzle ISO5167-2003 Venturi ___	Averaging Pitot Tube ___	
	Orifice AGA3-2003 Flange Pressure Taps ___	Nozzle ISO5167-2003 ISA 1932 ___	Standard V-Cone ___	
	Orifice AGA3-2003 Corner Pressure Taps ___	Nozzle GOST 8.586-2005 Long Radius ___	Wafer Cone ___	
	Integral Orifice ___	Nozzle GOST 8.586-2005 Venturi ___	Wedge ___	
	Small Bore Orifice Flange Pressure Taps ___	Nozzle GOST 8.586-2005 ISA 1932 ___		
	Small Bore Orifice Corner Pressure Taps ___	Venturi ASME-MFC-3-2004 "As-Cast" Convergent Section ___		

V-Cone Y Method	McCrometer ___	ASME ___
V-Cone Simplified Liquid Calculation	Yes ___	No ___
V-Cone Maximum Flow Rate on Sizing (in ft3/sec when Volume Flow, lb/sec when Mass Flow. User selectable Volume/Mass units when using DTM)	__________	
V-Cone Maximum Differential Pressure on Sizing (in inH2O @ 39.2°F. User selectable when using DTM)	__________	
Use Wedge Fixed Flow Coefficient?	Yes ___	No ___
Wedge Fixed Flow Coefficient	__________	
Beta Factor for Wedge (in)	__________	
Segment Height for Wedge (in)	__________	
Use Fixed Viscosity?	**Yes**___	No___
Fixed Viscosity Value (cP)	__________	
Use Fixed Density?	**Yes** ___	No ___
Fixed Density Value (lb/ft^3)	__________	
Use Fixed Expansion Factor?	Yes___	**No**___
Expansion Factor Fixed Value	__________	
Isentropic Exponent Value	__________	
Use Fixed Discharge Coefficients?	Yes___	No___
Discharge Coefficient 1 Fixed Value	__________	
Discharge Coefficient 2 Fixed Value	__________	
Discharge Exponent	0.5 ___	0.75 ___
Use Fixed Temperature Expansion Factor?	Yes___	**No**___
Temperature Expansion Factor Value	__________	
Reynolds Number Low Limit	__________	
Reynolds Number High Limit	__________	
Pipe Roughness (in)	__________	
Initial Radius (in)	__________	
Inter-control Interval (yr)	__________	

Bore Material (Gost Standard)	35П ___	30,35 ___	18Х2Н4МА ___	08Х22Н6Т ___
	45П ___	40,45 ___	38ХН3МФА ___	37Х12Н8Г8МФБ ___
	20ХМП ___	10Г2 ___	08Х13 ___	31Х19Н9МВБТ ___
	12Х18Н9ТП ___	38ХА ___	12Х13 ___	06ХН28МдТ ___
	15К,20К ___	40Х ___	30Х13 ___	20П ___
	22К ___	15ХМ ___	10Х14Г14Н14Т ___	25П ___
	16ГС ___	30ХМ,30ХМА ___	08Х18Н10 ___	
	09Г2С ___	12Х1МФ ___	12Х18Н9Т ___	
	10 ___	25Х1МФ ___	12Х18Н10Т ___	
	15 ___	25Х2МФ ___	12Х18Н12Т ___	
	20 ___	15Х5М ___	08Х18Н10Т ___	
Bore Material (Non-Gost Standard)				304 Stainless Steel ___
				316 Stainless Steel ___
				304/316 Stainless Steel ___
				Carbon Steel ___
				Hastelloy ___
				Monel 400 ___
				Other ___
Bore Diameter (in)	__________			
Bore Diameter Measured Temperature (°F)	__________			
Bore Temperature Expansion Coefficient (in/in°F)	__________			
Pipe Material	35П ___	30,35 ___	18Х2Н4МА ___	08Х22Н6Т ___
	45П ___	40,45 ___	38ХН3МФА ___	37Х12Н8Г8МФБ ___
	20ХМП ___	10Г2 ___	08Х13 ___	31Х19Н9МВБТ ___
	12Х18Н9ТП ___	38ХА ___	12Х13 ___	06ХН28МдТ ___
	15К,20К ___	40Х ___	30Х13 ___	20П ___
	22К ___	15ХМ ___	10Х14Г14Н14Т ___	25П ___
	16ГС ___	30ХМ,30ХМА ___	08Х18Н10 ___	
	09Г2С ___	12Х1МФ ___	12Х18Н9Т ___	
	10 ___	25Х1МФ ___	12Х18Н10Т ___	
	15 ___	25Х2МФ ___	12Х18Н12Т ___	
	20 ___	15Х5М ___	08Х18Н10Т ___	
Bore Material (Non-Gost Standard)				304 Stainless Steel ___
				316 Stainless Steel ___
				304/316 Stainless Steel ___
				Carbon Steel ___
				Hastelloy ___
				Monel 400 ___
				Other ___
Pipe Diameter (in)	__________			
Pipe Diameter Measured Temperature (°F)	__________			
Pipe Temperature Expansion Coefficient (in/in°F)	__________			

Advanced Display Configuration

Advanced Display - Screen Format	**Large PV** ___	PV & Bar Graph ___	PV & Trend ___			
Advanced Display - PV Selection	**Flow Value** ___	Meter Body Temperature ___				
	Differential Pressure ___	Temperature Sensor Resistance ___	Process Temperature ___			
	Static Pressure ___	Loop Output (mA) ___	Percent Output ___			
Advanced Display - Display Units	**inH$_2$O @ 39.2°F** ___	bar ___	ft^3/sec ___	gal/min ___	kg/sec ___	bbl/day ___
	inH$_2$O @ 60°F ___	mbar ___	ft^3/min ___	gal/h ___	kg/min ___	°C ___
	inH$_2$O @ 68°F ___	atm ___	ft^3/h ___	gal/day ___	kg/h ___	°F ___
	ftH$_2$O @ 68°F ___	Torr ___	m^3/sec ___	lb/sec ___	t/sec ___	°R ___
	inHg @ 0°C ___	gf/cm^2 ___	m^3/min ___	lb/min ___	t/min ___	K ___
	psi ___	kgf/cm^2___	m^3/h ___	lb/h ___	t/h ___	% ___
	mmH$_2$O @ 4°C ___	Pa ___	m^3/day ___	g/sec ___	ton/sec ___	Custom Unit ___
	mmH$_2$O @ 68°F ___	kPa ___	l/min ___	g/min ___	ton/min ___	
	mmHg @ 0°C ___	MPa ___	l/h ___	g/h ___	ton/h ___	
Advanced Display - Decimals	None ___	**1** ___	2 ___	3 ___		
Advanced Display - PV Scaling	None ___	**Convert Units** ___	Linear ___			
Advanced Display - Scaling Low	__________					
Advanced Display - Scaling High	__________					
Advanced Display - Display Low Limit	__________					
Advanced Display - Display High Limit	__________					
Advanced Display - Custom Unit	_________					
Advanced Display - Custom Tag	_______________					
Advanced Display - Trend Duration (h)	____					
Advanced Display - Language	**English** ___	Spanish ___	Turkish ___	German ___	Japanese ___	
	French ___	Italian ___	Chinese ___	Russian ___		
Advanced Display - PV Rotation	**Enabled** ___	Disabled ___				
Advanced Display - Sequence Time (sec)	____					

Glossary

AWG	American Wire Gauge
DP	Differential Pressure
DE	Digital Enhanced Communications Mode
EEPROM	Electrically Erasable Programmable Read Only Memory
EMI	Electromagnetic Interference
FDC	Field Device Configurator
FTA	Field Termination Assembly
HART	Highway Addressable Remote Transmitter
HCF	HART Communication Foundation
Hz	Hertz
inH_2O	Inches of Water
LP	Low Pressure (also, Low Pressure side of a Differential Pressure Transmitter)
LRL	Lower Range Limit
LRV	Lower Range Value
mAdc	Milliamperes Direct Current
MBT	Meterbody Temperature
mmHg	Millimeters of Mercury
mV	Millivolts
Nm	Newton·meters
NPT	National Pipe Thread
NVM	Non-Volatile Memory
Pa	Measured static pressure in PV4 algorithm
PM	Process Manger
PSI	Pounds per Square Inch
PSIA	Pounds per Square Inch Absolute
PV	Process Variable
PWA	Printed Wiring Assembly
RFI	Radio Frequency Interference
RTD	Resistance Temperature Detector
SMV	Smart Multivariable
SFC	Smart Field Communicator
STIM	Pressure Transmitter Interface Module
STIMV IOP	Pressure Transmitter Interface Multivariable Input/Output Processor
URL	Upper Range Limit
URV	Upper Range Value
US	Universal Station
Vac	Volts Alternating Current
Vdc	Volts Direct Current

INDEX

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P

R

S

T

U

Sales and Service

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ASIA PACIFIC

Honeywell Process Solutions,
(TAC) **hfs-tac-support@honeywell.com**

Australia
Honeywell Limited
Phone: +(61) 7-3846 1255
FAX: +(61) 7-3840 6481
Toll Free 1300-36-39-36
Toll Free Fax:
1300-36-04-70

China – PRC - Shanghai
Honeywell China Inc.
Phone: (86-21) 5257-4568
Fax: (86-21) 6237-2826

Singapore
Honeywell Pte Ltd.
Phone: +(65) 6580 3278
Fax: +(65) 6445-3033

South Korea
Honeywell Korea Co Ltd
Phone: +(822) 799 6114
Fax: +(822) 792 9015

EMEA

Honeywell Process Solutions,
Phone: + 80012026455 or
+44 (0)1344 656000

Email: (Sales)
FP-Sales-Apps@Honeywell.com
or
(TAC)
hfs-tac-support@honeywell.com

AMERICA'S

Honeywell Process Solutions,
Phone: (TAC) 1-800-423-9883 or
215/641-3610
(Sales) 1-800-343-0228

Email: (Sales)
FP-Sales-Apps@Honeywell.com
or
(TAC)
hfs-tac-support@honeywell.com

For more information
To learn more about SmartLine Transmitters,
visit **www.honeywellprocess.com**
Or contact your Honeywell Account Manager

Process Solutions
Honeywell
1250 W Sam Houston Pkwy S
Houston, TX 77042

Honeywell Control Systems Ltd
Honeywell House, Skimped Hill Lane
Bracknell, England, RG12 1EB

Shanghai City Centre, 100 Jungi Road
Shanghai, China 20061

Honeywell

www.honeywellprocess.com

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